NOTICE D'INSTALLATION

OPERATION & INSTALLATION MANUAL

CALYPSO

LOCH ELECTROMAGNETIQUE
ELECTROMAGNETIC SPEED LOG

99MU001-C

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1. DESCRIPTION

The **CALYPSO** is a new generation electromagnetic log designed for heavy tonnage vessels requiring more than 100m cable between probe and main cabinet.

For standard operation, it uses model BEN 65mm probe and can be adapted to other BEN probes having the same electrical characteristics, according to the type of vessel.

The log includes a linearity correction function allowing accurate calibrating. 5 correction points allow a log correction better than 0.5 knots on the whole measuring range.

The log **CALYPSO** includes an automatic gain adjustment for optimum accuracy. A permanent self-test signals any possible log faults on LCD screen.

1.1 EQUIPMENT DESCRIPTION

Standard equipment includes :

- ❒ one main cabinet with :
  - ♦ 1 LCD screen for digital and pseudo-analog speed display
  - ♦ 1 electromechanical mile totalizer
  - ♦ 1 daily mile totalizer (on LCD)
  - ♦ 1 display unit allowing adjustment of the different correction point.
  - ♦ 1 dimmer
- ❒ one transmitter cabinet
- ❒ one 65.2.RVB.20 probe supplied with 20m length cable, retractable at sea.
- ❒ one hull-fitting with valve, 65.1.RVB (retractable-valve-bronze alloy), screw-on type
  or
- ❒ one hull-fitting with valve, 65.1.RVI (retractable-valve-stainless), weld-on type.

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Options :

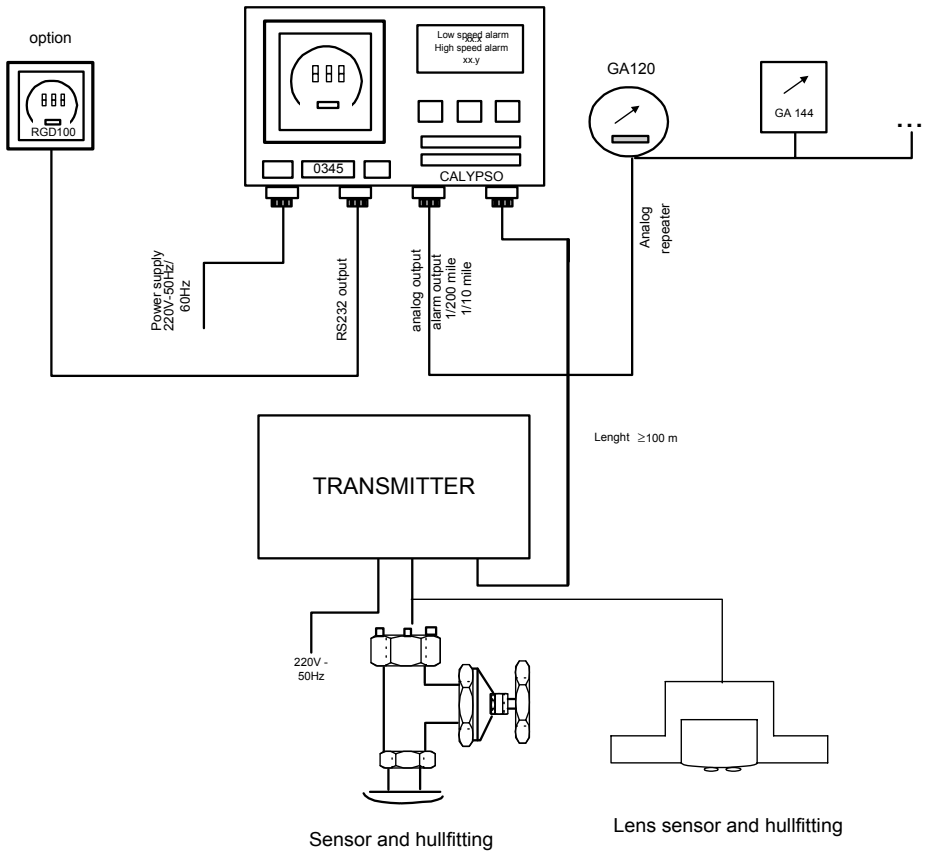
- ❒ GA 120 analog speed and distance repeater
  scale- 2 + 16 knots
  scale - 3 + 24 knots
  scale - 5 + 25 knots
  scale 0 + 48 knots
  scale 0 + 32 knots

- ❒ RGD 100 combined repeater
  - digital and pseudo-analog speed
  - covered distance/with reset
  - covered distance/without reset

- ❒ XY version

- ❒ Lens sensor with stainless steel hullfitting designed for double hull vessels or for location into submerged ballast tank.

Installation plan



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1.2 MAIN FEATURES

- ❒ Watertight main cabinet made of a molded alloy, installed on a bracket or flush mounted.

  IP 65 tightness
  Size : 244 x 164 x 95 mm

- ❒ LCD screen for :

  Speed display on circular bargraph
  Digital speed display : 0.1 knot definition
  Covered distance/reset : 99999.9
  Double scale : 25 or 50 knots
  Test and fault data

- ❒ Electromagnetic mile totalizer without reset

  6 digits - Unit : 0.1 nautic mile

- ❒ LCD screen, 2 lines, 16 digits for :

  5-linearisation-point adjustment
  Error message display
  Display of :

longitudinal speed transversal speed resultant speed drift angle	for XY version (optional)

- ❒ Brightness control
- ❒ Permanent self-test
- ❒ Automatical gain control
- ❒ Accuracy after calibration ± 2 %
- ❒ For a roll leading to an oscillation of ± 3 Knots of the displayed speed with a period of 4 seconds, the damping device of the equipment reduce this oscillation to a value lower than ± 0.3 Knot.
- ❒ Variation of the displayed speed according to water temperature is lower than 0.2 Knot.
- ❒ Variation of the displayed speed according to water salinity is lower than 0.2 Knot.

Nota : No distance limitation between sensor and electronic unit. Please refer to drawing “Cabling and installation configuration.

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1.3 TECHNICAL FEATURES

Power supply :

220Vac 50/60Hz (± 10 %)
Option : 110 Vac 50/60 Hz (± 10 %)
24 Vdc (+30% -10%)

Inputs / Outputs :

4 x 1/200 mile, potential free contact outputs, 24V, 250mA
1 x 1/10 mile, open collector output, 24V, 500mA
2 x analog outputs 0 to 500 µA
2 x RS422 outputs- NMEA 183 format
1 x RS422 input
2 x frequency inputs

Linear damping adjustment up to 60 seconds.

Equipment Description

P/N	Name	Qty	Weigh t	Description
PVBEN296	Main unit	1	4 kg	IP65 metal unit
PVBEN300	Transmitter	1	4 kg	IP65 metal unit
PUBEN056	Probe 65.2.RVB.20	1	5 kg	Retractable with 20m cable
PVBEN350	Hull fitting 65.1 RVI	1	6 kg	Weldable with valve
Options				
	XY version			
	GA120 galvanometer		0.5 kg	
PVBEN295	RGD100 combined repeater 144x144		2,5 kg	Digital speed, distance and alarm repeater
Fi lscgp 9822	2 shielded pairs probe cable			Sensor cable
PVBEN306	Lens probe (replacement by diver)	1		30m submersible cable
PVBEN308	Lens Hull fitting	1		No valve

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1.4 PROBES AND HULL FITTINGS

Probe Type	Material	Hull fitting	Hull material	Drawing n°
PUBEN056 **65.2.RVB**	Bronze alloy	PVBEN349 **- 65.1.RVB** Hull fitting, bronze alloy, screw-on, valve, for probe retractable at sea	Plastic fiber polyester Wood	D0342
PUBEN056 **65.2.RVB**	Bronze alloy	PVBEN350 **- 65.1.RVI** Stainless steel, weld-on, with valve, for probe retractable at sea	Stainless steel	D0343
PVBEN306 **Lens probe**	Loaded resin	PVBEN308 **– Lens hullfitting** Weld on (stainless steel) hull fitting for lens probe.	Steel	7851.M
PVBEN306 **Lens Probe**	Loaded resin	PVBEN308-01 – Lens hullfitting Weld on (Aluminium) hullfitting for lens probe	Aluminium	F0354-M

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2. CHOICE OF HULL EQUIPMENT

1. According to vessel tonnage

   - Hull-fittings with valve (65.1 RVI - 65.1 RVB)
     . Are used on all types of vessels

   - Hull-fittings without valve (Lens – Diver type)
     are used on all types of vessels + double hull vessels.

2. Hull fitting cannot be used in dangerous compartments (fuel, hydrocarbons, chemicals).

3. Check hull strength before installating hull fitting.

4. Hull fitting must be installed in compliance with the specifications of the vessel classification company.

5. Power supply wiring must comply with the specifications of the vessel classification company.

Probe location

The probe measures the water speed along the hull. This speed is always lower than the vessel real speed because the water friction along hull creates a water drag. The water drag thickens up from fore to aft. The measured speed gets near real speed afore the vessel because of the hull profile, hydrodynamic penetration coefficient is minimum in the fore.

Speed distribution does not depend on fouling of the hull located in the boundary layer. Therefore, the ratio of the vessel real speed over measured speed is constant.

The probe must be located near the bow, as far forward as possible. It must always remain immerged even in stormy weather.

If the probe emerges occasionally, this can cause a short disturbance which doesn't affect the total distance information).

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In order to protect the probe against docking maneuvers, it is recommended to weld two strips on both sides of the probe close to the hull-casing flanges. Their dimensions will be calculated depending on the desired protection. This strips can be protected in order not to interfere with the flow.
The line joining the electrodes of the probe must be perpendicular to the vessels longitudinal axis.

For vessels with a bulge bow, the area located within distance equal to twice the height of the bulge can be disturbed. The probe must be preferably located in the bulge. When it is not possible to install the probe up front, it is recommended to fix it where interferences are the lowest as defined during requirement tests.

For special installation cases, please contact an BEN Marine certified agent.

Make sure that the hull fitting is quickly and easily accessible. Cargo holds cannot be considered as accessible because of stored goods.

General rules for probe installation

Before proceeding or drilling, etc. make sure that there is room enough for retraction of the probe and vital service work.

If the hull plating is not flat enough at the selected area, it is necessary to flatten the hull or fit a flattened hull reinforcement.

Welding the hull casing to the hull requires special care.

For welding to a carbon steel hull, use electrodes in austenitic alloy : 24 % CR, 12 % NI, 3 % Mo or 20 % CR, 12 % NI, 3 % Mo". Welding will be preferably made in argon atmosphere.

All hull-fittings are fitted with a plastic outer cap (part n°16 on drawing D0343). **This part is vital and shall be carefully put in place and sticked using tightness cement during installation**. If damaged, replace it immediately.

Anti-fouling paint must not be removed by abrasion. In certain cases, it is neither possible nor recommended to put the probe immediately in its working position, in order not to damage it. Obturate hull-casing by turning the valve off, or with the designed cap.

When installation is over, do not forget to clean the probe.

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2.1 SCREWED-TO-HULL-FITTING WITH VALVE TYPE 65.1.RVB WITH 65.2.RVB20 PROBE (or Type 48.1.RVB WITH 48.1.RVB.16 sensor)

(Drawing n° D0342)

Steel hulls may be too thin and require suitable reinforcement : minimum total thickness must be 25 mm.

Note : Reinforcement is always recommended on any type of hull.

1. Check that actual thickness of the hull (including the reinforcement) is less than the tolerated thickness. Remove the probe from the hull-fitting and from piece (16). Remove the 0-rings.

2. Drill a 64.5 mm diameter hole in the hull for 48.1 RVB probes or 93 mm diameter hole for 65.2. RVB probes. . Remember to flatten external surface in order to get a perfect bearing of piece flange (1). For plastic hull, refer to "Installation recommendations". Do an external chanfer (about 5 mm - 45°) for easy mounting and proper positioning of piece 1.

Caution : Safety of the vessel depends from installation.

3. Position hull casing (1) and use self polymerizing mastic for tightness, such as rubber, silicone, rilsan). Mastic layer must be thin. Let it harden to a pasty consistency.

4. Screw casing nut (2) on to hull casing. To avoid the hull casing from unscrewing, block it with a wedge.

5. Screw the four thru-bolts ref (3) into the nut threaded holes (piece ref. 2) and butt them firmly against the hull plating in order to prevent future unscrewing of the nut. If necessary, punch the hull through threaded hole to ensure good blocking. For plastic hulls, it is recommended to glue the nut to the hull with polymerizing fibered polyester.

6. Clean and grease 0-rings (11) an (12). Put them in place. Install the gate valve and properly adjust it.

7. Put the upper 0-ring (6) in place in its landing, suitably greased. Install the upper flange (5).

8. Screw the safety nuts (19) on thru-bolt (3) forcing moderately and equally. Do not forget the washers (18).

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9. Put lower 0-ring (13) in place.

10. Fill the inner part of outer bush (16) with self polymerizing silicone rubber such as "syntofer".

11. Introduce isolating part ref (16) with force. Make sure that it is properly positioned. Check that nothing protrudes and try to introduce the probe from the outside. Let the mastic harden before going on.

12. Grease flat seal (7) and put it in place.

13. Carefully lubricate the probe and introduce it in its proper location.

DO NOT GREASE THE ELECTRODE.

14. Use high performance marine grease supplied with spares. When properly positioned, the sensitive surface of the probe protrudes at least 1 mm from external bush. The red mark on the probe head is directed towards the bow.

15. Fix probe flange (8) with screws (9) and washers (20) ; put circlip 15. Connect the link (10). Check link length : it must be long enough to allow valve turn-off and short enough to prevent probe from escaping and passing over the 0-ring (6).

When using anti-fouling paint, **DO NOT PAINT THE ELECTRODES**.

Note : In order to avoid probe damage, it is recommended to put probe in place just before departure, or while at sea (in this case, do not forget to close the valve).

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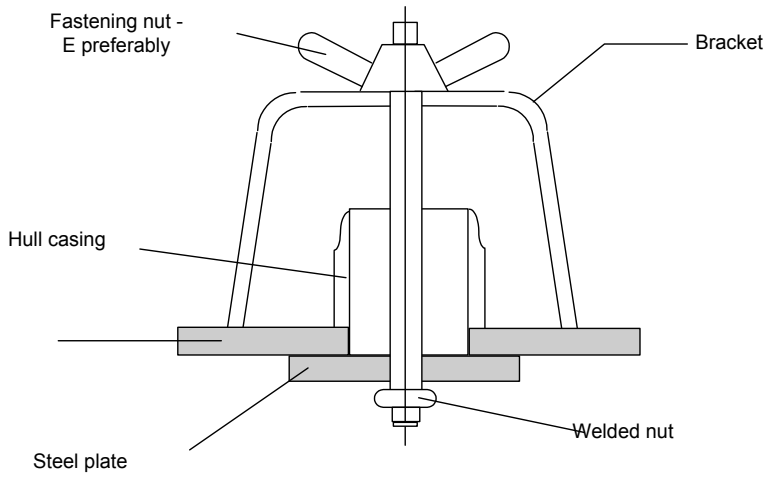
2.2 WELDED-TO-HULL-FITTING WITH VALVE TYPE 65.1.RVI WITH 65.2.RVB.20 PROBE (or Type 48.1.RVI WITH 48.1.RVB.16 sensor)

(Drawing n° D0343)

Drill a 77 mm diameter hole in the hull for 48.1 RVI probes OR 92 mm diameter hole for 65.2.RVB probes.. Do an external chamfer of 5 mm (45°) for welding.

1. Hull-casing (1) must be properly positioned, follow suggested procedure on drawing hereunder. A positioning tool is recommended for the welding. Weld the hull-fitting to he hull. After three or four spots have been welded on the internal side of the hull, remove the tool. Check that the lower part of hull-casing does not protrude the hull, and grind the external seam flush with the hull.

IMPORTANT : Hull-fitting mechanical tolerances are very precise. In order to avoid any possible damage, do not heat the hull-fitting when welding it.



2. Weld piece ref (2) on hull-casing (1).

3. Weld the four tru-bolts (3) on lower flange (2) - is not done in factory for hull-fittings with (RVI type) valves. Once upper flange has been put in place, screw nuts (19) moderately and equally.

4. Clean and oil up 0-rings (11) + (12). Put them in place. Install and position the gate valve (4).

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5. Put 0-ring (6) and position upper flange (5).

6. Screw nuts (19) - do not forget the washers (18) - on the thru-bolts (3).

7. Put the lower 0-ring seal ref (13) in place. Fill the inner part of the outer bush ref (16) with self polymerizing silicone rubber. Force the isolating part inside and clips it. Check positioning of hull-casing and also check that nothing protrudes inside by carefully introducing the probe. Let the paste harden the time required.

8. Put flat seal (7) in place. Carefully lubricate the probe and introduce it. Use grease supplied with spares.

9. Do not put grease on the electrodes. It would isolate them.

10. When properly positioned, the red mark on the head is directed towards the bow.

11. When probe flange (8) is in place, use screws (9) to hold it with hull-fitting. Do not forget washers (20) and the circlips (15).

12. Connect the link (10). Check link length. It must be long enough to allow valve turn-off and short enough to prevent probe from escaping and passing over O-ring (6).

The sensitive surface of the probe must protrudes at least 1mm from the hull.

It is recommended to put probe in place as late as possible, in order to avoid any damage (do not forget to turn the valve off).

If antifouling paint is used :

DO NOT PAINT THE ELECTRODES

DO NOT GREASE THE ELECTRODES

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2.3 SCREWED-TO-HULL-FITTING WITHOUT VALVE TYPE 48.1.RB OR 48.1.RBL WITH 48.1.RB OR 48.1.RVB PROBE (Drawing n° C1285/C1301)

Above fittings are either made of bronze (48 RB) or in aluminum (48 RA) according to the hull material. They are convenient for hulls of maximum thickness 30mm, including hull reinforcement. Minimum clearance for probe retraction is 150 mm distance from inside hull. For thick hulls, a longer hull-fitting has been designed (48 RBL hull-fitting). Maximum thickness of the hull is 110 mm. Minimum clearance for probe retraction is 410mm. A threaded cap ref (25) is supplied with the hull-fitting in order to obturate the opening when the probe is removed.

1. Drill a 64.5 mm diameter hole in the hull. Do an external chamfer (about 5 mm - 45° -).

2. Put hull-casing in place. Tightness is obtained by a self polymerizing silicon rubber in order to prevent rotation of the body when unscrewing (23). Use a silicon rubber or any equivalent material. The rubber seal must not be thicker than 0.2mm. Wait until its hard enough to screw.

3. Fill the inner part of outer bush ref (16) with rubber or self polymerizing silicon. Be careful to fill only as shown on drawing. Force the bush, check that the bush is properly clipsed and that nothing protrudes. Test the clearance by introducing the probe preferably from outside. Let the paste harden before going on.

4. Put the washer (24) and the nut (23). The nut (23) must be locked by a conventional mechanical system (refer to the drawing). As to the RBL hull-fitting, it is possible to add a second nut acting as a lock-nut.

5. Put previously greased 0-ring in place, and flat seal (7) and carefully introduce the probe.

Attention : Do not grease the electrodes, it would isolate them.
We recommend to use high performance marine grease supplied with spares.
If anti-fouling paint is used, DO NOT PAINT THE ELECTRODES

Attention : Red mark on probe-head must be directed towards the bow.

6. Screw probe nut (8). Do not forget the circlips (15).

DO NOT GREASE THE ELECTRODES

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2.4 WELDED-TO-HULL-FITTING WITHOUT VALVE TYPE 48.1.RI WITH 48.1.RB PROBE (Drawing n° C1287)

1. Drill a 77 mm diameter hole in the hull. Do an external chamfer of 5 mm (45°) for welding.

2. Position hull-casing (1). To obtain accurate positioning, follow suggested procedure on the drawing. After three or four spots have been welded on internal side of hull, remove the mechanical system and check the positionning. Hull-casing must be flush with the hull. After welding, grind the external seam on a level with hull surface in order to allow piece (16) to butt on piece (1).

IMPORTANT : Hull-fitting mechanical tolerances are very tight. In order to avoid any destroying risk, do not heat the hull-fitting when welding it.

3. Fill the inner part of outer bush ref (16) with self polymerizing silicon rubber. Fill only the part indicated on the drawing. Force the bush in, check that it is properly clipsed and that nothing protrudes. Test the clearance by introducing the probe preferably from outside. Let the paste harden as required before going on.

   Weld lower flange (2) to hull casing (1).

4. Weld the thru-bolts (3) before filling the inner part of outer bush with self polimerizing silicon rubber.

5. Grease 0-ring (13) and put it in place.

6. Do not forget flat seal (7), and fix the probe. Install probe flange (8) in place, screw the thru-bolts with nuts (19) and washers (18). Do not forget the circlips (15).

Caution :
To introduce the probe, use high performance grease supplied with spares.
When using anti-fouling paint, DO NOT PAINT THE ELECTRODES.
The red mark on the probe head is directed towards the bow.
DO NOT GREASE THE ELECTRODES.

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2.5 LENS PROBE WITH HULL FITTING MADE OF STAINLESS STEEL

A/ INSTALLATION PROCEDURE

1. Drill a 184mm hole in the hull. Do an external chamfer of 5mm (45°) for welding.

2. Position hull-fitting in the correct mounting direction.

The reference mark drawn on hull-fitting is oriented towards bow, it must be exactly parallel to the vessel axis.
The hull-fitting defines the mounting direction of the lens probe.

When the hull-fitting is welded, grind the external seam on a level with hull surface in order not to create hydraulic interferences around the probe.

3. Weld a steel pipe to back of hull-fitting.
Ø = 40mm - Thickness = Minimum 5mm
This pipe will be stopped at 50mm above maximum waterline.

4. Introduce the probe after pulling watertight cable into the pipe.

5. Brush probe bottom with watertight rubber before fixing it with its 4 screws.

Caution : DO NOT GREASE THE ELECTRODES.
When using anti-fouling paint, DO NOT PAINT THE ELECTRODES.

B/ DISMOUNTLING AND CHANGING OF SENSOR

1/ Cut off power supply of the electronic.
2/ disconnect the watertight cable sensor from the electronic.
3/ Strongly attach the watertight cable to a rope of at least the length of pipe.
4/ Send a diver to unscrew the four fixation screws of sensor.
5/ Screw-up the two extraction screws in order to push out the sensor from its hullfitting.
6/ Extract the complete defective sensor with its watertight cable and the rope attached to it.
7/ Strongly attach the new sensor's watertight cable to the rope and pull back up the cable for a new connection.

Caution : Before replacing the sensor in its hullfitting, don't forget to apply the watertight o'ring by silicone mastic.

This equipment is DNV and GL type approved.

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3. INSTALLING THE ELECTRONIC UNITS

Main unit

The log can be flush mounted on to a bulkhead at any angle, and attached with 4 screws.
The log can be supplied with a bracket upon which it can be mounted with variable inclination for optimum mounting in any case.

❏ The cover of the log is hinged. Leave enough space on the left-hand side for opening.

❏ After terminal connecting, pull out as many wires as possible before tightening stuffing boxes in order to limit HF radiations inside unit.

❏ If wires are hardened, they should not be hardened beyond stuffing boxes input and should be grounded to casing via stuffing boxes.

Power supply : 220Vac - 50Hz - Average consumption : 25mA.
For a 220 Vac power supply, the value of the fuse is 125mA.

Transmitter unit

❏ Transmitter unit can be flush mounted or wall mounted with 4 screws.

❏ After terminal connecting, pull out as many wires as possible before tightening stuffing boxes in order to limit HF radiations inside the unit.

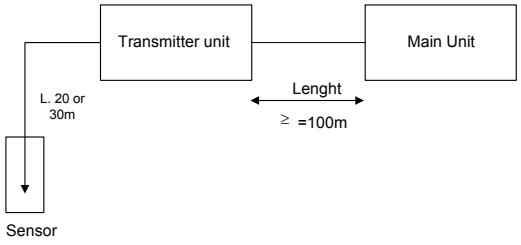
❏ If wires are hardened, they should not be hardened beyond stuffing boxes input and should be grounded to casing via stuffing boxes.

❏ Power supply : 220Vac - 50Hz

❏ The probe cable is 20 or 30m long. The transmitter unit will be as near probe as possible.

❏ Only one shielded cable links transmitter to main unit.

interconnection block diagram



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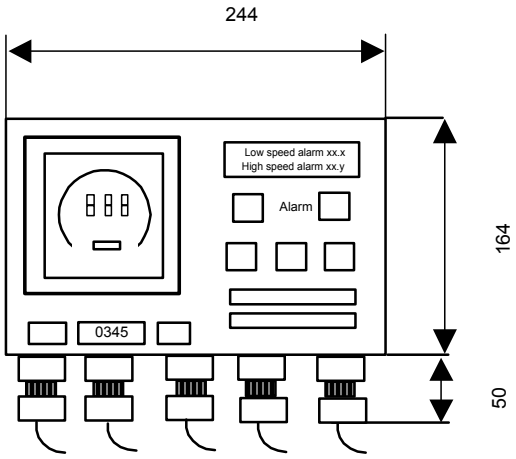
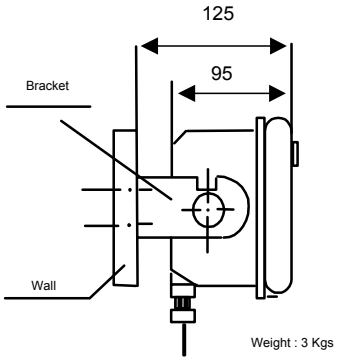
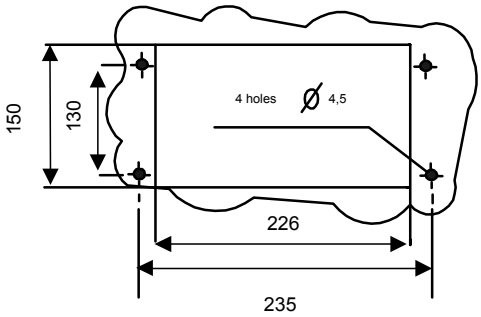
3.1 ELECTRONIC CASES : SIZE AND INSTALLATION

MAIN UNIT MOUNTING

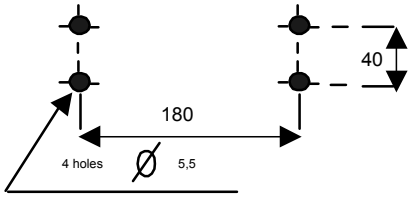




FLUSH-MOUNTING



BRACKET MOUNTING



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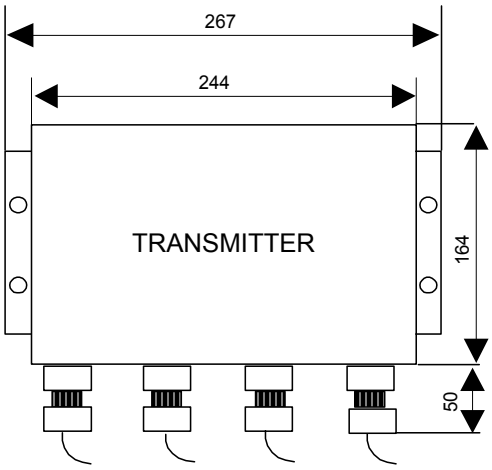
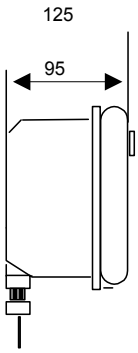
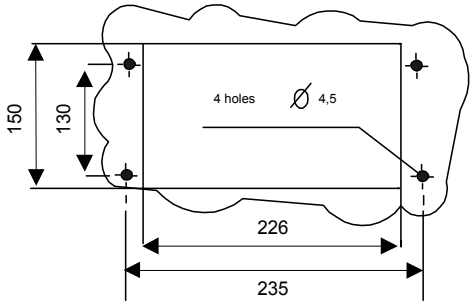
TRANSMITTER UNIT MOUNTING

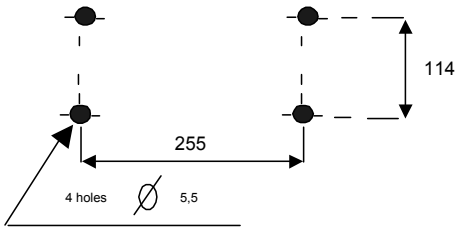




FLUSH-MOUNTING



BRACKET MOUNTING



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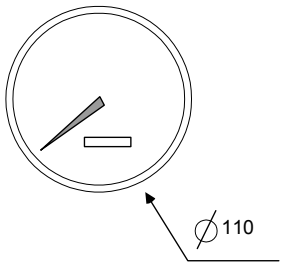
3.2 INSTALLING THE ANALOG SPEED AND DISTANCE REPEATER

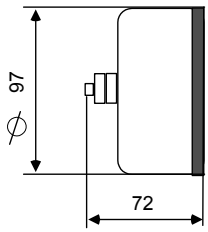
The speed and distance repeater is a wide-angle galvanometer with a waterproof front surface.

It can be placed on an outside panel. The rear part of this panel however, must be protected from water projections.

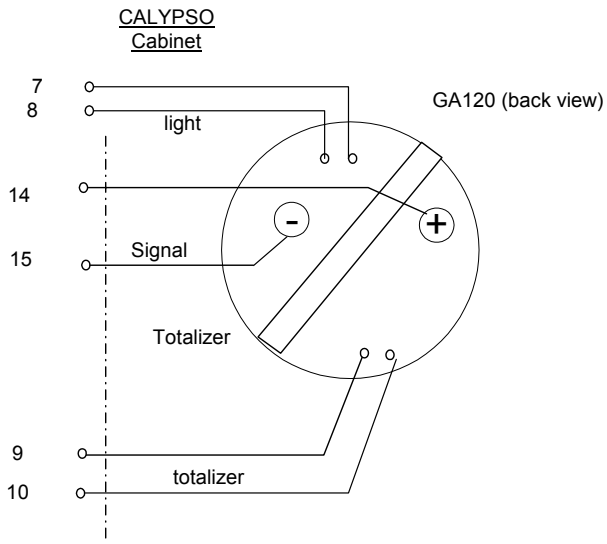
This repeater also has a 12V - 35 mA lighting. Power supply comes from the log.

ANALOG SPEED AND DISTANCE REPEATER GA120





GA120 CONNECTIONS



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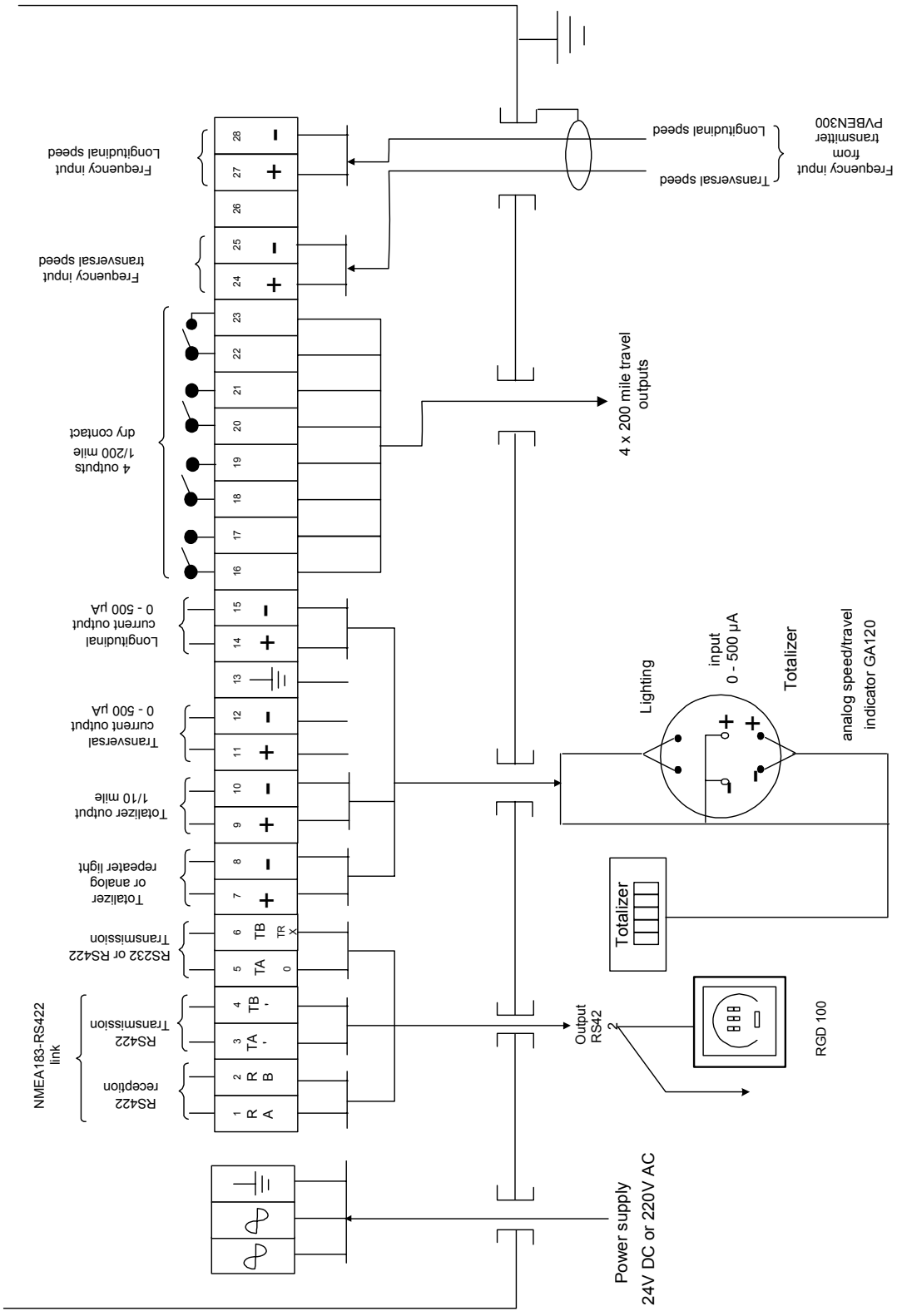
3.3 SUB-SYSTEM CONNECTIONS

MAIN UNIT CONNECTIONS



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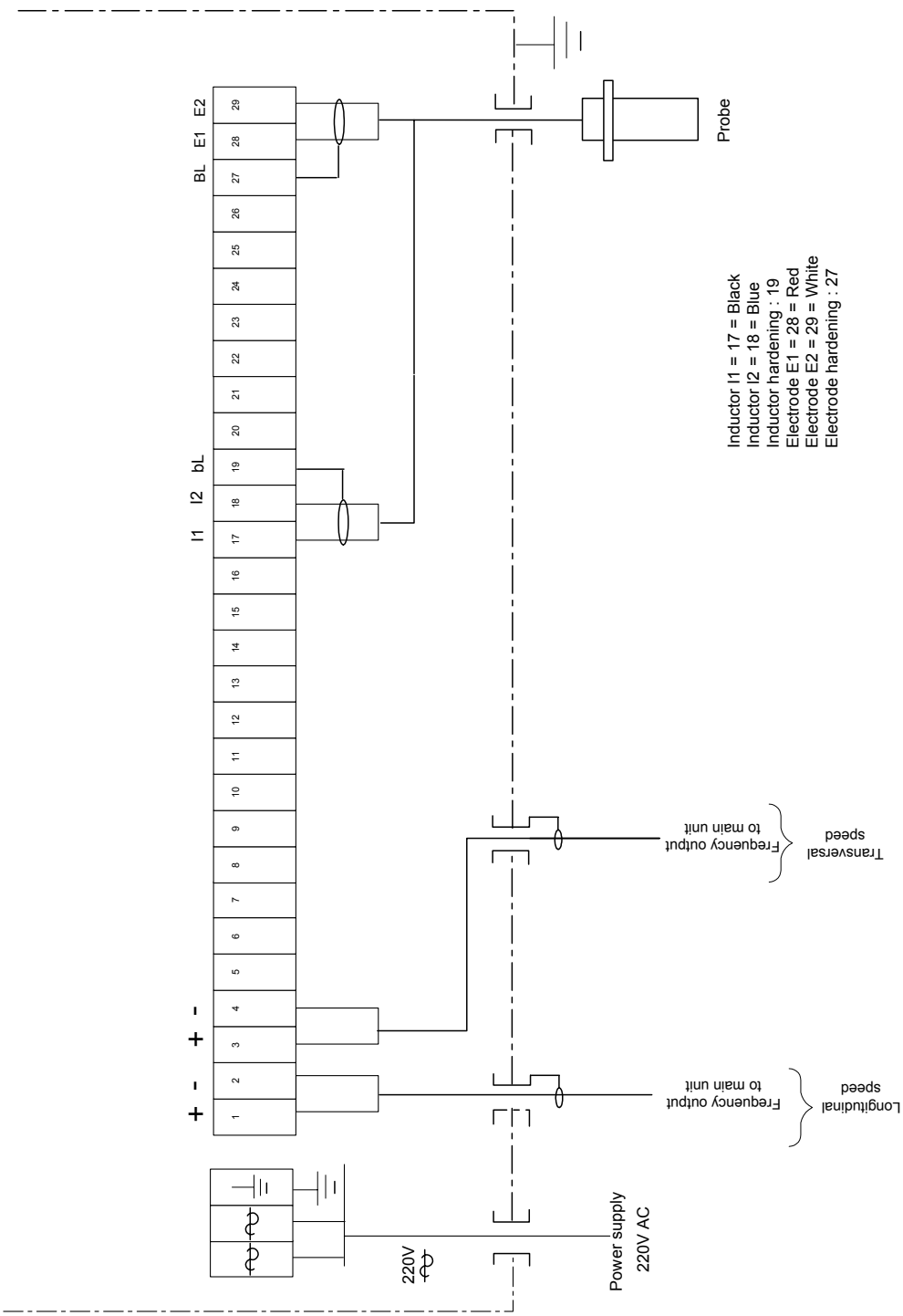
TRANSMITTER UNIT CONNECTIONS



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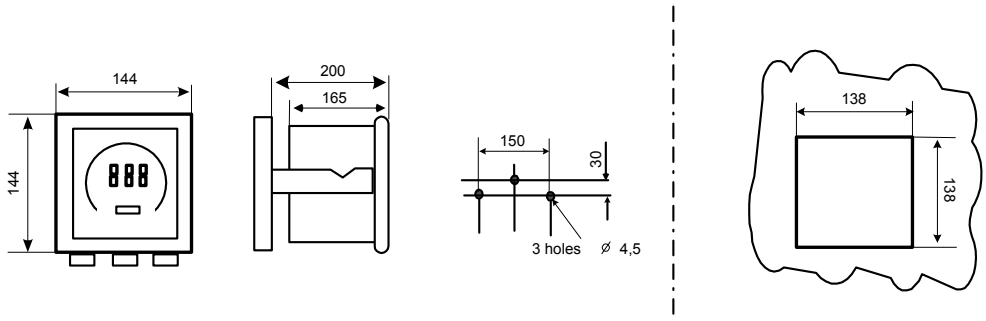
3.4 COMBINED SPEED AND DISTANCE REPEATER : INSTALLATION

The repeater is a 144 x 144 mm watertight case.

It shows :

Digital and pseudo-analog speed : 1/20 knot definition
1/10 mile definition
Distance/reset
Log status (test - alarms)
Reset and brightness control are on front panel
Power supply : 220V - 50Hz
Wiring is made via connector block and stuffing box, 5 repeaters can be connected

RGD100 REPEATER



Bracket mounting

Flush mounting

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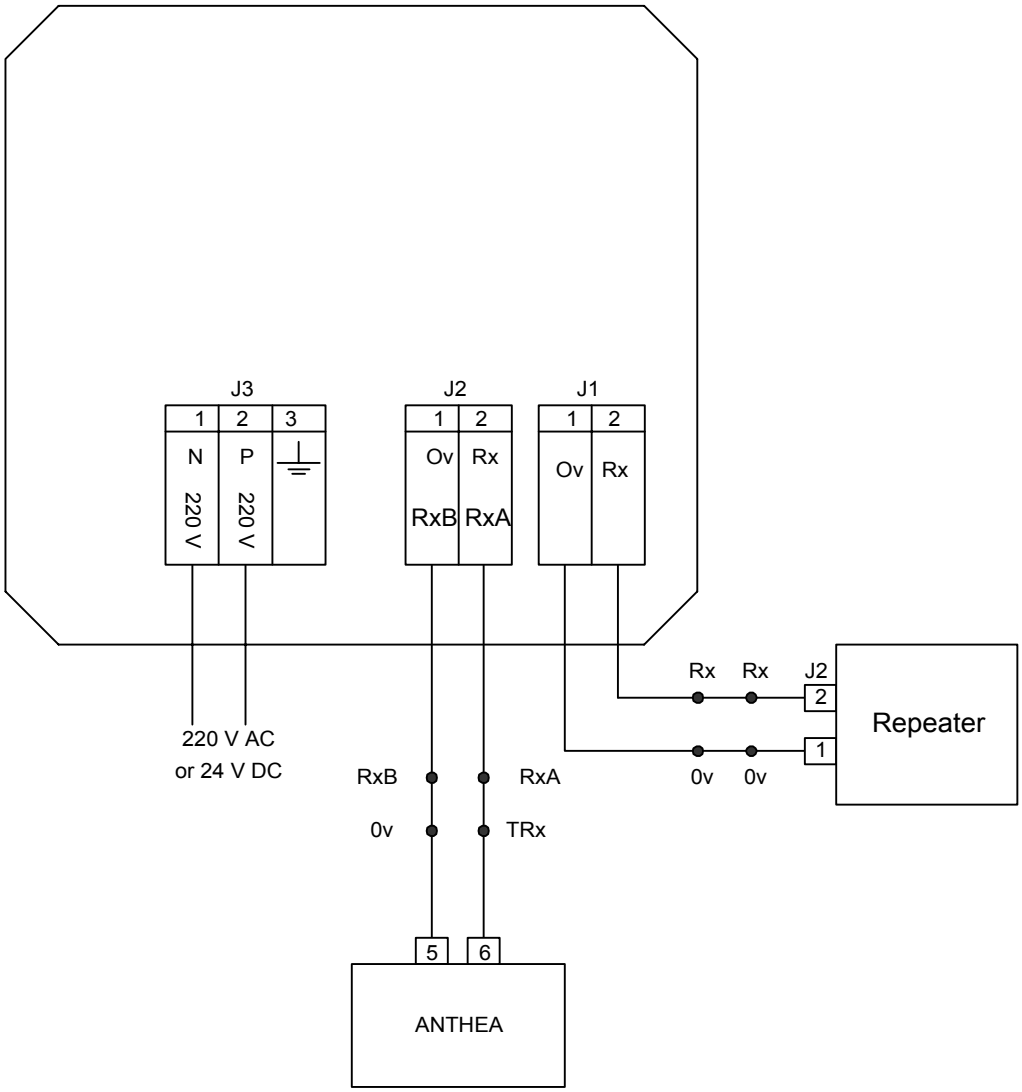
RGD100 CONNECTING



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4. TESTS, ADJUSTMENTS AND CALIBRATION UPON FIRST USE

Preliminary tests

Once installation is completed, a checkout must be performed before turning the power on.

Main unit

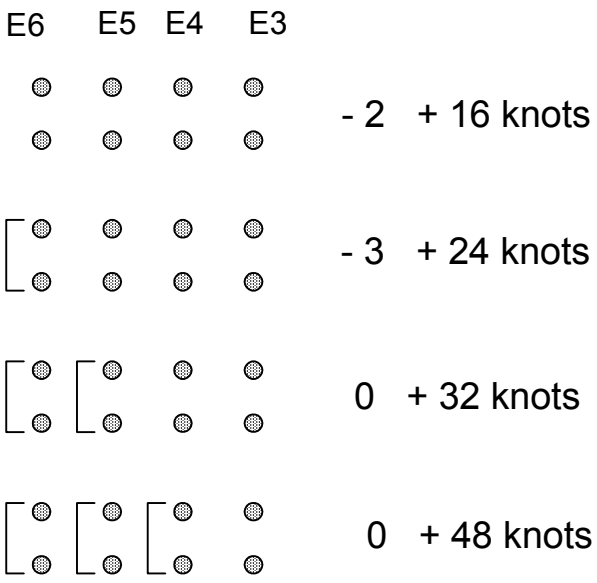
Open main unit and switch to TEST mode (red point). If no speed is displayed, check the battery voltage, then the fuse.

When the equipment is on, speed displayed on TEST mode is 14.53 knots ± 0.1.

When the GA120 galvanometer is used, check the programing of current output (see "Current output" paragraph). Check that all outputs run. Switch to "NORMAL".

Transmitter unit

Open transmitter unit and switch to "TEST" mode.
Transmitter sends a speed equal to 80% of scale as defined by straps E6 - E5 - E4 - E3 positioning, to the main unit, i.e. :



Check transmitter and main unit operating.
Switch to "NORMAL" mode.

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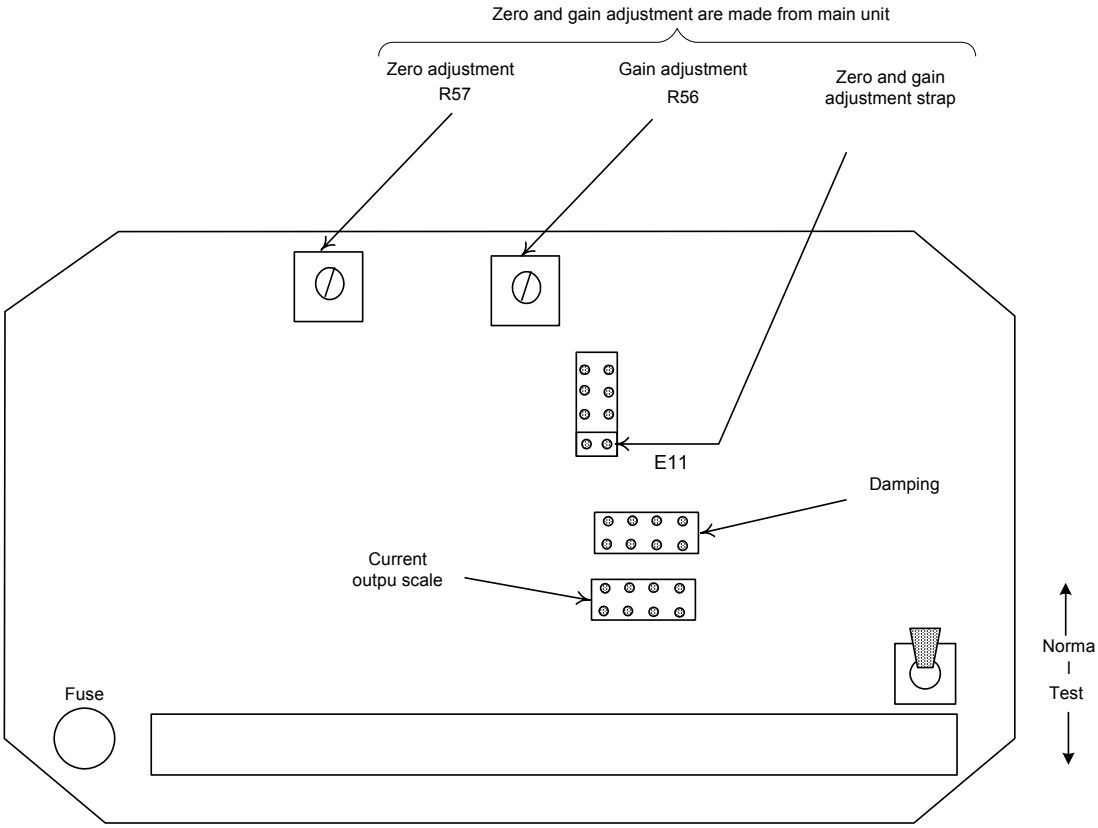
TRANSMITTER BOARD STRAP POSITIONS



Damping		Current output scale	
	Damping 32 seconds		- 2 + 16 knots
	Damping 16 seconds		- 3 + 24 knots
	Damping 4 seconds		0 + 32 knots
			0 + 48 knots

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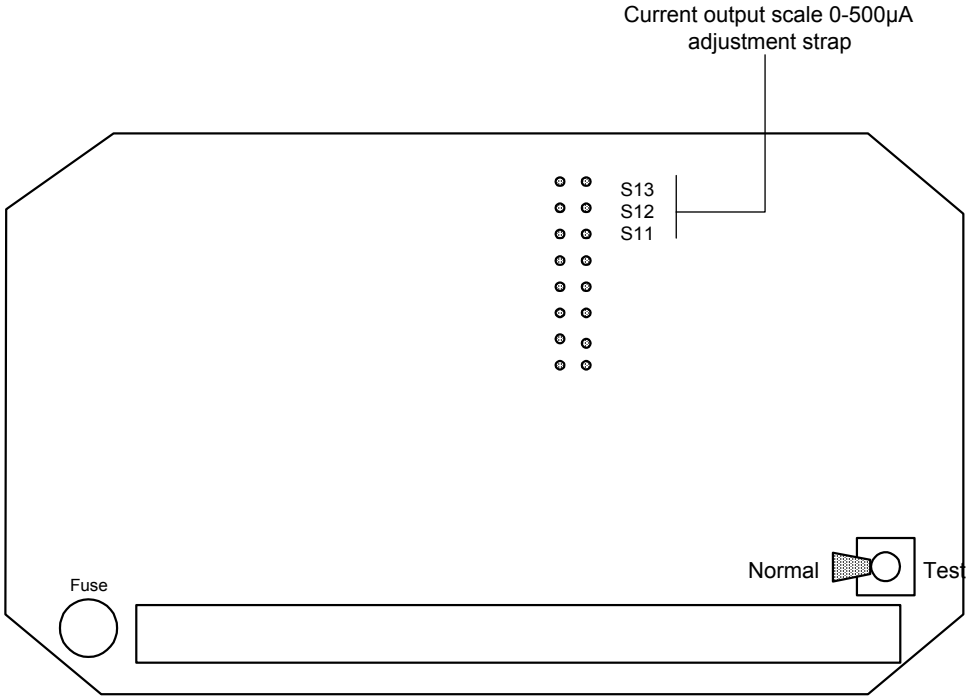
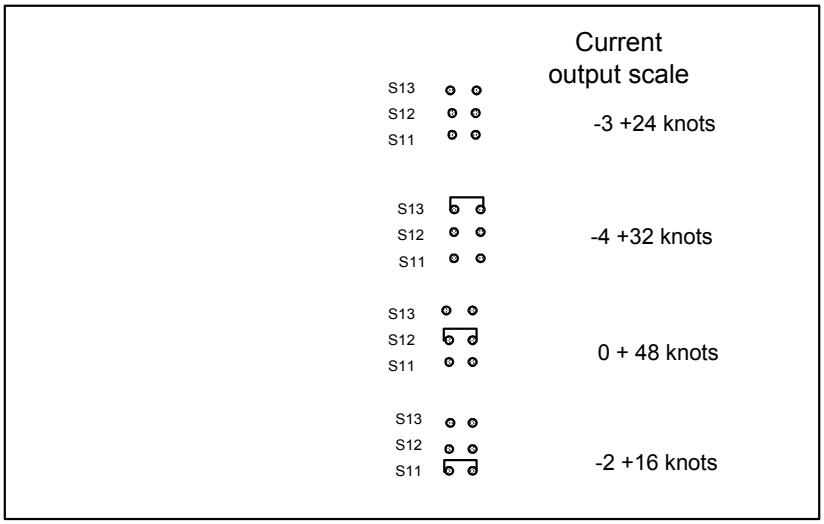
MAIN BOARD STRAP POSITION





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Main Display unit adjustment

Zero adjustment

When vessel is motionless on dead calm water, speed may be above zero. You then have to correct this zero shift.

Make sure there is no undertow.

You can easily check it by putting probe back to front to check zero does not change.

If it does, zero can be adjusted by equalizing absolute speed values when probe is in normal position and is back to front. Do not forget then to put probe back in correct position (red mark towards vessel bow).

Press	**Display** **(on the 2 x 16-digit lines)**
Press ENTER* Enter Key 97 by pressing ↑ and ↓ Press ENTER Press VALIDATE*, on 1st line Press ↑ and ↓ for zero adjustment Press ENTER to validate adjustment	KEY KEY 97 ZERO ADJUSTMENT ZERO X.XX LINE 1 = LOG SPEED XX.XX LINE 2 = PROBE SPEED XX.XX

***IMPORTANT NOTE : ENTER = ALARM ON**
VALID = ALARM OFF

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Gain adjustment process

Pass in "TEST" mode and wait a few minutes, until the speed indication is stable. Note test value.
Calculate the new test value :

Ex. : In test position, speed indication is 20 knots and we want a gain correction of –0,8 %

$$\frac{20.0 \text{ x } 0,8}{100} = 19,84 \text{ noeuds}$$

Press	**Display (on the 2 x 16-digit lines)**
Press ENTER	KEY
Enter Key 97 by pressing ↑ and ↓	KEY 97
Press ENTER	ZERO ADJUSTMENT
Press ENTER	GAIN ADJUSTMENT
Press VALIDATE	GAIN X.XX
Press ↑ and ↓ for gain adjustment	
Press ENTER to validate adjustment	LINE 1 = LOG SPEED XX.XX LINE 2 = PROBE SPEED XX.XX

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4.1. LOG CALIBRATION

An E/M log measures speed and distance in relation to water. When there is no current, the distance indicated by the log is the distance in relation to the ground or the true distance.

Several methods can be used :

a) Empirical method

Using the average of the measurements of long distances covered in comparison with the real distances.

b) Rational method

Using the measurements of speed in covering the same base distance several times.

The device is set for the average sensitivity of its probes in the factory.

If the first method is used, calculate the average relative error for a certain number of runs at different times and with different tide levels, but at roughly the same speed.

It is convenient to calculate these errors in percentages. The average error is calculated by taking the average of the relative errors. A large enough number of runs must be made, as in the following tables :

Runs listed by order	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Error	- 2%	- 5%	+ 7%	- 6%	+ 2%	+ 1%	+ 4%	+ 3%	+ 1%	+ 3%

- 2 - 5 + 7 - 6 + 2 + 1 + 4 + 3 + 1 + 3 = + 8

The average relative error is $\frac{8}{10} = + 0.8\ \%$

The correction is : - 0.8 %

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4.2 CALIBRATION OVER SHORT DISTANCES

It is possible to calibrate the log with precision by covering a known base distance defined by alignment on the shore, preferably following a route defined by an alignment.

Calculating true or real speed :
Clock the time needed to cover the base distance : the true or real speed Vr is:

$$Vr = \frac{Dr}{Tr} \times 3600$$

Dr =Real distance covered
Tr = Time taken to cover the distance in seconds

Calculation of the log speed

The log speed must not be read on the speed display as the measurement would not be precise enough. The average speed must be determined by clocking the time spent to complete the distance.

A second stop watch is useful, but if you only have one, the same method can be used by taking the times on the first stop watch as you go.
With a second stop watch, measure the time spent to cover the distance displayed on the distance counter. Start the stop watch as soon as the first one tenth of a mile figure changes after entering the base distance zone. Stop the stop watch when the base distance has been covered or just before reaching the end of the distance when the tenth of a mile figure changes.
Do not change the speed or the direction of the vessel until this measurement has been taken.

V1 log speed is : $V1 = \frac{D1}{T1} \times 3600$

Let Dd and Df respectively be the distances displayed at the beginning and at the end of the trip ; the distance displayed on the log will be :

$$D1 = Df - Dd$$

If the time measured between the display of Dd and Df is T1, the average speed indicated on the log is :

$$V1 = \frac{D1}{T1}$$

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Tr and T1 are not identical, since the beginning and the end of each of these timings are not identical.

If the base distance is long enough to be able to accept an approximation of a tenth of a mile, just note the indications on the distance counter upon entering and leaving the base distance zone.

The above measurements are to be taken over several runs.

a) When in a zone where the current remains constant throughout the tests, the base distance zone should be covered a second time in the opposite direction, carrying out the same operations. The average of the speeds obtained is then calculated :

$$Vaverage = \frac{V1 + V2}{2}$$

b) If the current is not constant, a third run in the same direction as the first will be made, as long as the tests are made consecutively with no time out between any two test runs. The average is calculated as follows :

$$Vaverage = \frac{V1 + 2V2 + V3}{4}$$

V1 = speed calculated on the first run
V2 = speed calculated on the second run
V3 = speed calculated on the third run

Always try to operate at the speed given by the log, modifying the engine speed controls if necessary.

Do not perform the measurements while the tide is turning.

Having found the average real speeds and the average log speeds, a simple calculation will provide the percentage of error of the log.

The percent error is :

$$\frac{100V1 + Vr}{V1}$$

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This error may be positive or negative.

Example : suppose that 1.1 mile is covered in a clocked time of Tr1 = 364 seconds.

The real speed will be :

$$\frac{1.1 \times 3600}{364} = 10{,}9 \text{ knots}$$

The average real speed will be :

$$\frac{10.1 + 10.9}{2} = 10.5 \text{ knots}$$

Suppose that during the first run over the base distance, the stop watch was started when the distance counter was at : **24.1 miles**, and that it was stopped when the distance counter was at : **25.4 miles**, the stop watch will have run 400 seconds.

The distance read from the distance counter will be : 25.4 - 24.1 = 1.3 mile.

Calculating the indicated speed gives :

$$\frac{1.3 \times 3600}{400} = 11.7 \text{ knots}$$

During the second run the stop watch was started when the distance counter was at **26.0 mile** and stopped when the distance counter was at **27.2 mile**, the stop will have run 372 seconds.

The distance read from the distance counter is : 27.2 - 26 = 1.2 mile.

The speed calculated is :

$$\frac{1.2 \times 3600}{372} = 11.6 \text{ knots}$$

The average value of the speeds indicated is :

$$\frac{11.7 + 11.6}{2} = 11.65 \text{ knots}$$

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Error correction :

First evaluate the error in percentage. In the above example, the error :

$$\frac{100 \text{ x } (11.65 \text{ - } 10.5)}{11.65} = + 10\ \%$$

The correction to be made is therefore : - 10 %.

Switch to "TEST" mode and wait a few seconds till speed display is stabilized.

Note test value.

Calculate new test value : for example :

Test value = 18 knots

New value = $18 \text{ knots} - \frac{18 \text{ x } 10}{100} = 16.2 \text{ knots}$

Change test value by the gain adjustment method (§.4)

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4.3 DAMPING ADJUSTMENT

Damping adjustment process

Press	ENTER	Key
Enter key 8 by pressing	↑ ↓	Key 8
Press	ENTER	Damping
Press	VALIDATE	
Message on 1st line		Damping 00
To adjust damping, press	↑ ↓	Damping XX
To validate adjustment, press	ENTER	Line 1 = Log speed Line 2 = sensor speed

4.4 CURRENT OUTPUT

The current output scale is defined according to strap position :

S13	S12	S11	
0	0	0	24 knots
0	0	1	16 knots
0	1	0	48 knots
1	0	0	32 knots

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5. OPERATING

5.1 BRIGHTNESS CONTROL

Press (*) to adjust brightness.
Optimum brightness can be adjusted on speed circular bargraph.
When (*) key is released, the circular bargraph resumes its speed indicating function.
Press "Dist/Reset" to reset daily totalizer appearing on LCD screen.

5.2 LINEARITY ADJUSTMENT

Draw an error curve of log.

Example :

Real speed (in knots)	Speed display (in knots)
5	5.2
14	14.6
22	20.4

Enter correction couples

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Press	To	Display (on the 2 x 16-digit lines)
Enter	Key entry request	Key
↓ and ↑	Enter key 97	Key 97
Enter	Select menu	ZERO ADJUSTMENT
Enter	Select menu	GAIN ADJUSTMENT
Enter	Select menu	LINEARIZATION
Validate	Validate menu Set program on linearisation mode	*1 True speed xx.x 1 sens. speed xx.x
↓ and ↑	Adjust 1st linearisation point (real speed)	* 1 True speed 05.0 1 sens. speed xx.x
↕	Go to other line	1 True speed 05.0 * 1 sens. speed xx.x
↓ and ↑	Adjust 1st linearisation point (log speed)	1 True speed 05.0 * 1 sens. speed 05.2
↕	Go to other line	*2 True speed 14.0 2 sens. speed xx.x
↓ and ↑	Adjust 2nd linearisation point (real speed)	*2 True speed 14.0 2 sens. speed xx.x
↕	Go to other line	2 True speed 14.0 *2 sens. speed xx.x
↓ and ↑	Adjust 2nd linearisation point (log speed)	2 True speed 14.0 *2 sens. speed 14.6

Same process for 3rd, 4th and 5th correction point.
Program starts again normally after the 5 correction points have been entered.
0 knots corresponds to zero correction.

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5.3 CHANGE OF CIRCULAR BARGRAPH SCALE

The log has an automatic analog scale switch.over allowing an optimum reading.

When the vessel speed overpasses 25 Knots, the log automatically switches-over to the 50-knot scale. The log will switch-over again to the 25-knot scale when speed is lower than 24 Knots.

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6. ERROR MESSAGES

Any possible fault of log is detected by a permanent self test and displayed on the 2 x 16-digit lines LCD screen.

Possible error messages are :

- "Measure fault"
- "Sensor current"
- "Liaison Log"
- "Transmis. Fault"

Measure fault :
This message appears in the event of a faulty analog component, or when probe is out of water.

Probe current :
This message appears when there is no more current on probe. Check the probe (inductor) connections.

Liaison log :
This message appears after a transmission fault between the display board and the main board.

Transmis. fault :
This message appears when there is no signal in log frequency input. Check main cabinet connections (27 and 28) and transmitter connections (1 and 2).

If any of these messages appears, please contact one of BEN engineers.

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7. SERIAL OUTPUT NMEA 0183 – IEC 61162-1

7.1 DATA TRANSMISSION

- baud rate 4800
- data bits 8 (D7 = 0) , parity none
- stop bits 1

7.2 FORMAT OF SENTENCE INFORMATION

Version single axis:

$ V M V H W , , , , , x x x . x x , N , , * h h <CR> <LF>

$ V M V L W , x x x x x . x , N , x x x x x . x , N * h h <CR> <LF>

$ P B E N , 0 1 , a a a a * h h <CR> <LF>

Version dual axis :

$ V M V H W , , , , , x x x . x x , N , , * h h <CR> <LF>

$ V M V L W , x x x x x . x , N , x x x x x . x , N * h h <CR> <LF>

$ P B E N , 0 1 , a a a a * h h <CR> <LF>

$ V M V B W , x x x . x x , x x x . x x , A , , , V , , V , , V * h h <CR> <LF>

7.3 SENTENCE DESCRIPTION

--. Water speed and heading

$ V M V H W , , , , , x x x . x x , N , , * h h <CR> <LF>

$ V M V H W : Start of sentence and identifier

x x x . x x : longitudinal water speed in Knots

N : Knots

hh : Cheksum

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message recurrence 0.5 second

--. Dual ground / water speed

$ V M V B W , x x x . x x , y y y . y y , A , , , V , , V , , V * h h <CR> <LF>

$ V M V B W : Start of sentence and identifier

x x x . x x : Longitudinal water speed , knots

y y y . y y : Transversal water speed, knots

A : data valid , **V :** data invalid

hh : Cheksum

message recurrence 0.5 second

-- Distance travelled through the water

$ V M V L W , x x x x x . x , N , y y y y y . y , N* h h <CR> <LF>

$ V M V L W : Start of sentence and identifier

x x x x x . x : Total cumulative distance, nautical miles

y y y y y . y : Distance since reset, nautical miles

N: nautical miles

hh : Cheksum

message recurrence 1 second

-- Proprietary sentences

$ P B E N , 0 1 , a a a a * h h <CR> <LF>

$ P B E N , 0 1 , : Start of sentence and identifier

a a a a : alarms

hh : Cheksum

message recurrence 1 second

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DRAWINGS

N°	
	Cabling and installation configuration.
C1285	Probe 48.1 RVB/hullfitting 48.I RBL
C1287	Probe 481 RA/hullfitting 48.1 RA Probe 481 RB/hullfitting 48.1 RI
C1301	Probe 481RB/hullfitting 48.1 RB
D0342	Probe 48.1 RVB/hullfitting 48.1 RVB Probe 65.2 RVB/hullfitting 65.1 RVB
D0343	Probe 48.1 RVB/hullfitting 48.1 RVI Probe 65.2 RVB/hullfitting 65.1 RVI
F0187-C	BSR Cabling
6631-M	Blind LOG : size and installation of transmitter unit
	Outline drawing and mounting of ANTHEA unit
7851	Lens probe and hullfitting
F0354-M	Lens probe and Aluminium hullfitting

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CABLE INSTALLATION

Integrated Navigation system
Stabilizer system
SAT NAV, AUTOPILOT
TM, ARPA radars
BEN repeater(s)

Outputs for interface

CALYPSO

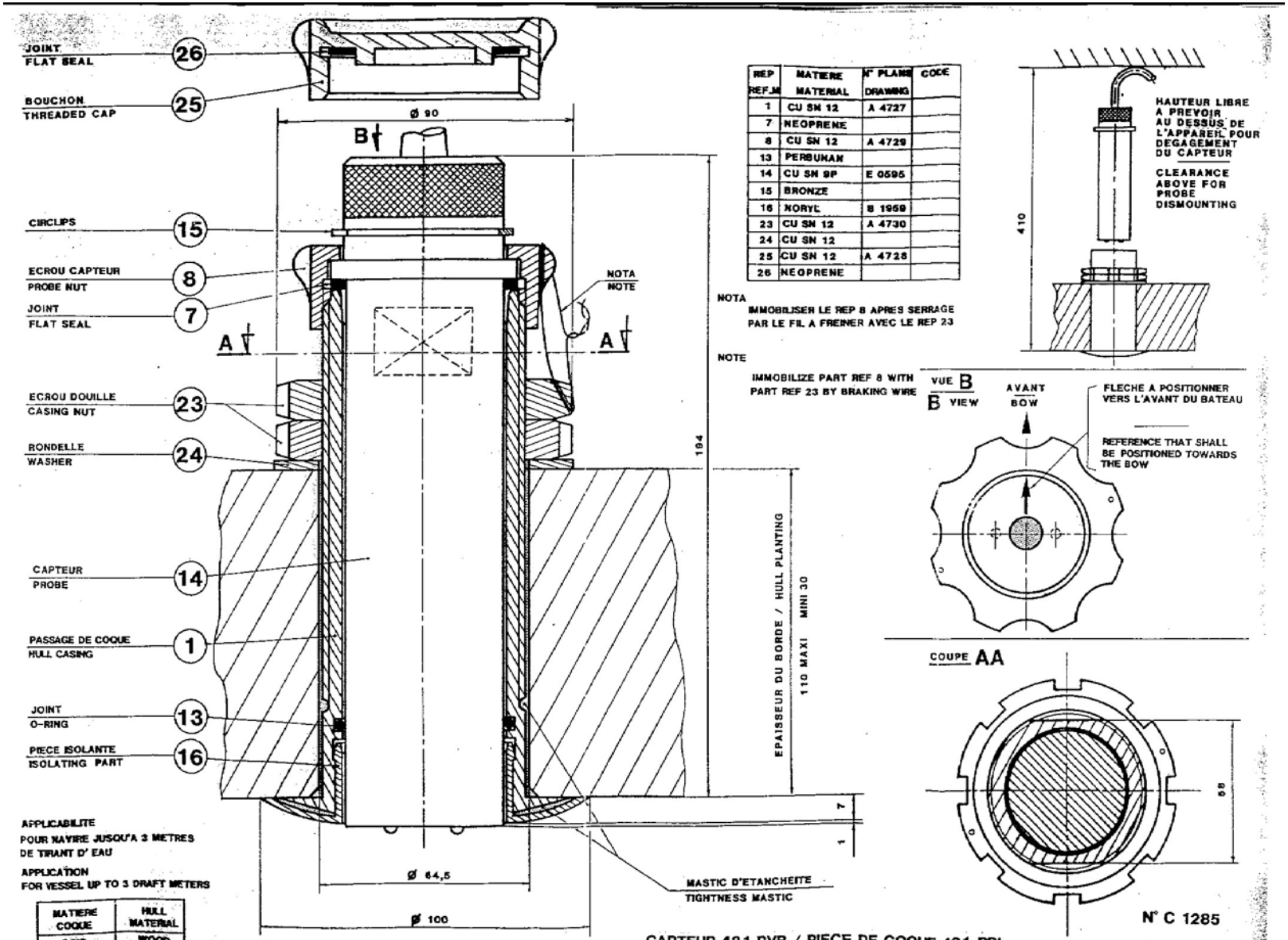
BRIDGE

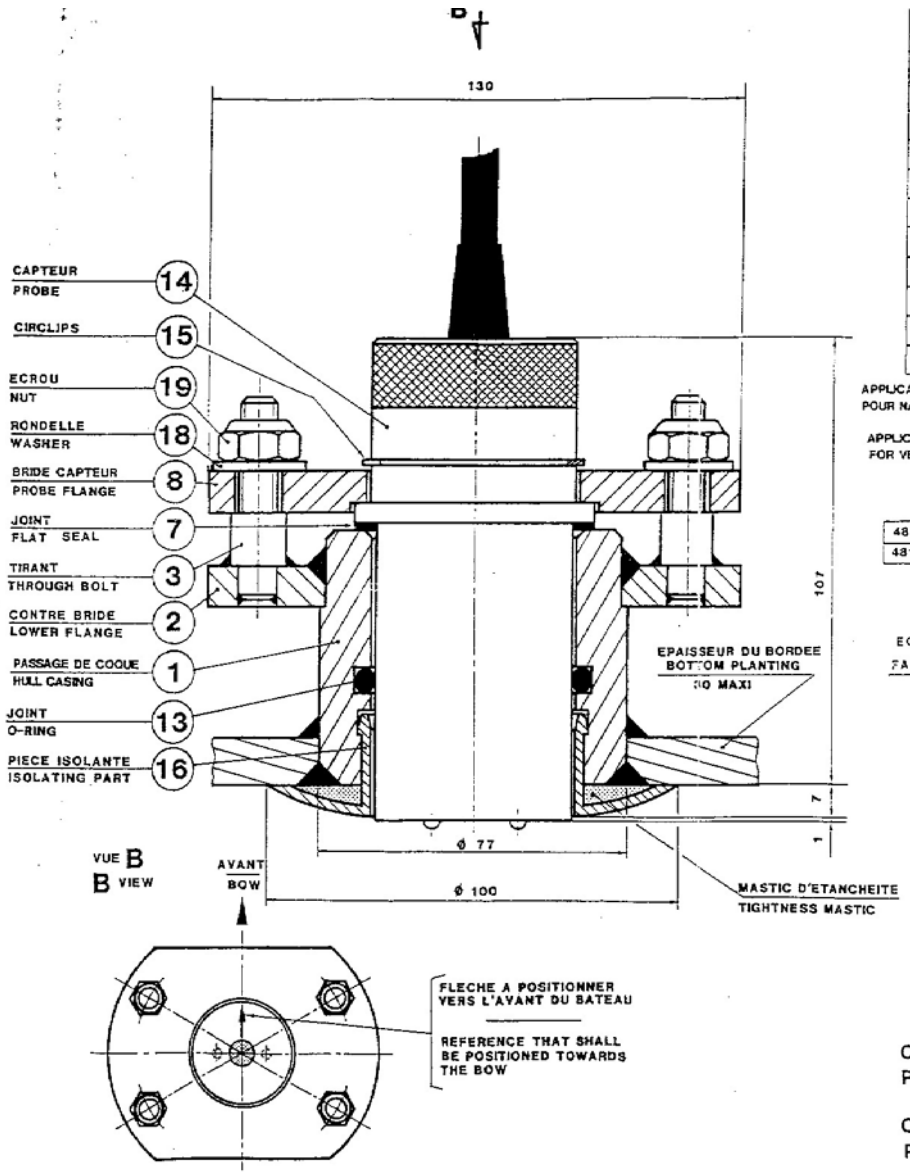
1 shielded pair (min=0.75²)
no distance limitation

TRANSMITTER

Sensor cable is supplied by BEN.

LENS SENSOR
or other (see front page)


JOINT
FLAT SEAL
26
BOUCHON
THREADED CAP
25
Ø 90
B
CIRCLIPS
15
ECROU CAPTEUR
PROBE NUT
8
JOINT
FLAT SEAL
7
NOTA
NOTE
A
A
ECROU DOUILLE
CASING NUT
23
RONDELLE
WASHER
24
CAPTEUR
PROBE
14
PASSAGE DE COQUE
HULL CASING
1
JOINT
O-RING
13
PIECE ISOLANTE
ISOLATING PART
16
184
EPAISSEUR DU BORDE / HULL PLANTING
110 MAXI MINI 30
7
1
Ø 64,5
Ø 100
MASTIC D'ETANCHEITE
TIGHTNESS MASTIC
APPLICABILITE
POUR NAVIRE JUSQU'A 3 METRES
DE TIRANT D' EAU
APPLICATION
FOR VESSEL UP TO 3 DRAFT METERS
MATIERE COQUE | HULL MATERIAL
BOIS | WOOD
REP REF.N° | MATIERE MATERIAL | N° PLANS DRAWING | CODE
1 | CU SN 12 | A 4727 |
7 | NEOPRENE | |
8 | CU SN 12 | A 4729 |
13 | PERBUNAN | |
14 | CU SN 8P | E 0595 |
15 | BRONZE | |
16 | NORYL | B 1959 |
23 | CU SN 12 | A 4730 |
24 | CU SN 12 | |
25 | CU SN 12 | A 4728 |
26 | NEOPRENE | |
NOTA
IMMOBILISER LE REP 8 APRES SERRAGE
PAR LE FIL A FREINER AVEC LE REP 23
NOTE
IMMOBILIZE PART REF 8 WITH
PART REF 23 BY BRAKING WIRE
410
HAUTEUR LIBRE
A PREVOIR
AU DESSUS DE
L'APPAREIL POUR
DEGAGEMENT
DU CAPTEUR
CLEARANCE
ABOVE FOR
PROBE
DISMOUNTING
VUE B
B VIEW
AVANT
BOW
FLECHE A POSITIONNER
VERS L'AVANT DU BATEAU
REFERENCE THAT SHALL
BE POSITIONED TOWARDS
THE BOW
COUPE AA
68
N° C 1285
CAPTEUR 481 RVB / PIECE DE COQUE 481 RBL
BEN

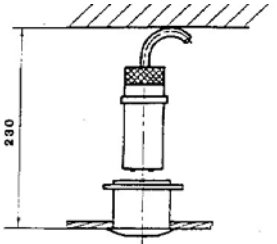


REP REF.M	MATIERE MATERIAL RA / RA	MATIERE MATERIAL RB / RI
1	AG 4	Z2CN18 10 304 L
2	AG 4	Z2CN18 10 304 L
3	AG 4	Z2CND17 12 316 L
7	HYDROILIT	HYDROILIT
8	AG 4	Z2CN18 10 304 L
13	PERBUNAN	PERBUNAN
14	AG 5	CU SN 9P
15	XC 75 1079	BRONZE
16	NORYL	NORYL
18	Z2CN18 10 304 L	Z2CN18 10 304 L
19	AG 4	Z2CN18 10 304 L

APPLICABILITE
POUR NAVIRE JUSQU'A 3 METRES DE TIRANT D' EAU

APPLICATION
FOR VESSEL UP TO 3 DRAFT METERS

	MATIERE COQUE	HULL MATERIAL
481 RA	ALUMINIUM	ALUMINIUM
481 RB	ACIER	STELL

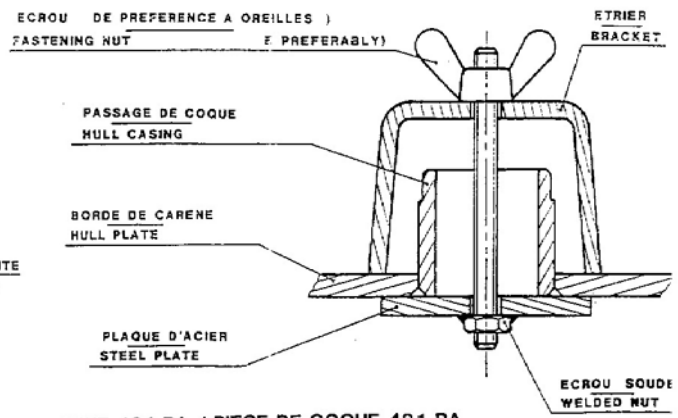


HAUTEUR LIBRE A PREVOIR
AU DESSUS DE L'APPAREIL
POUR DEGAGEMENT DU CAPTEUR

CLEARANCE ABOVE FOR
PROBE DISMOUNTING

OUTILLAGE PRECONISE POUR SOUDURE

ADJUSTED SYSTEM FOR WELDING

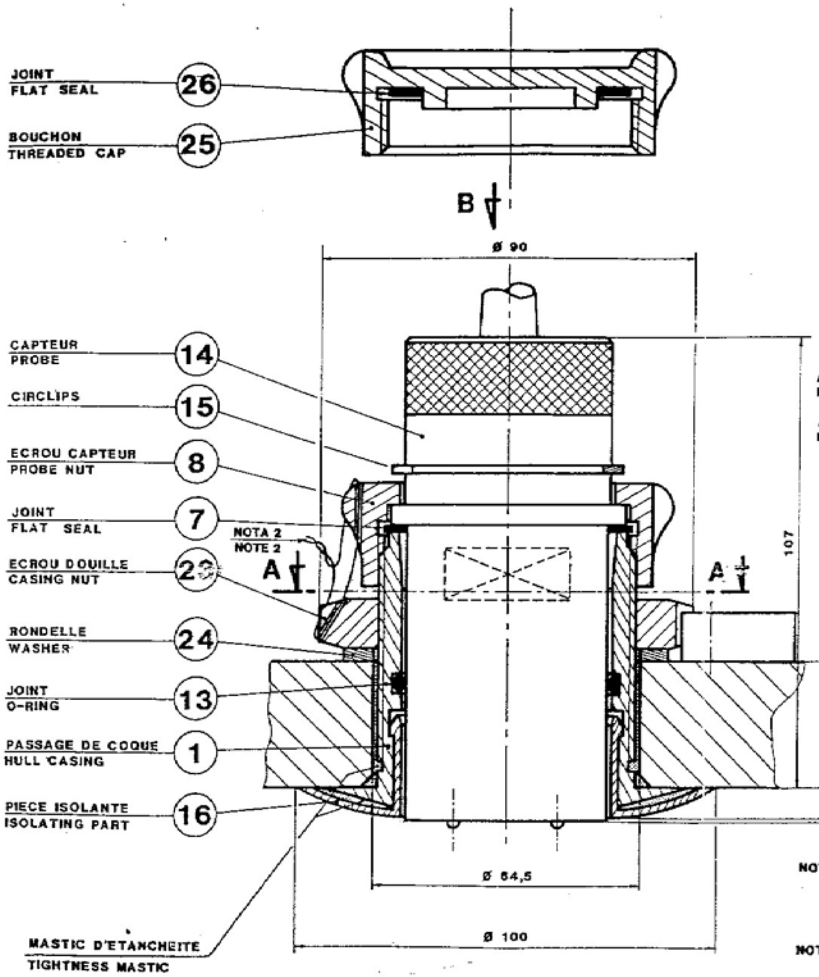


CAPTEUR 481 RA / PIECE DE COQUE 481 RA
PROBE 481 RA / HULL FITTING 481 RA

CAPTEUR 481 RB / PIECE DE COQUE 481 RI
PROBE 481 RB / HULL FITTING 481 RI

N° C 1287

BEN

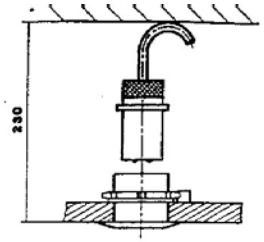


REP REF.N°	MATIERE MATERIAL	N° PLANS DRAWING	CODE
1	CU SN 12	A 5141	
7	NEOPRENE		
8	CU SN 12	A 4729	
13	PERBUNAN		
14	CU SN 9P	E 0595	
15	BRONZE		
16	NORYL	B 1959	
23	CU SN 12	A 4730	
24	CU SN 12		
25	CU SN 12	A 4728	
26	NEOPRENE		

APPLICABILITE
POUR NAVIRE JUSQU' A 3 METRES DE TIRANT D'EAU

APPLICATION
FOR VESSEL UP TO 3 DRAFT METERS

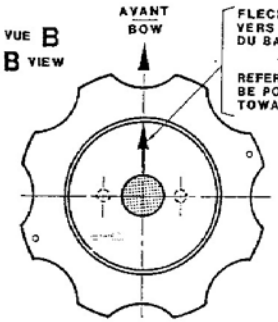
MATIERE COQUE	HULL MATERIAL
PLASTIQUE BOIS ACIER	PLASTIC WOOD STELL



HAUTEUR LIBRE A PREVOIR
AU DESSUS DE L'APPAREIL
POUR DEGAGEMENT DU CAPTEUR

CLEARANCE ABOVE FOR
PROBE DISMOUNTING

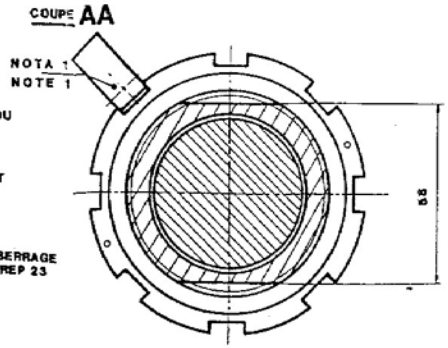
VUE B
B VIEW



FLECHE A POSITIONNER
VERS L'AVANT
DU BATEAU

REFERENCE THAT SHALL
BE POSITIONED
TOWARDS THE BOW

COUPE AA



NOTA 1
EVENTUELLEMENT PREVOIR L'IMMOBILISATION DE L'ECROU PAR RAPPORT A LA COQUE (FOURNITURE CHANTIER)

NOTE 1
IF POSSIBLE IMMOBILIZE NUT WITH REGARD TO HULL (YARD SUPPLY)

NOTA 2
IMMOBILISER LE REP 8 APRES SERRAGE PAR LE FIL A FREINER AVEC LE REP 23

NOTE 2
IMMOBILIZE PART REF 8 WITH PART REF 23 BY BRAKING WIRE

N° C 1301

BEN

CAPTEUR 481 RB / PIECE DE COQUE 481 RB

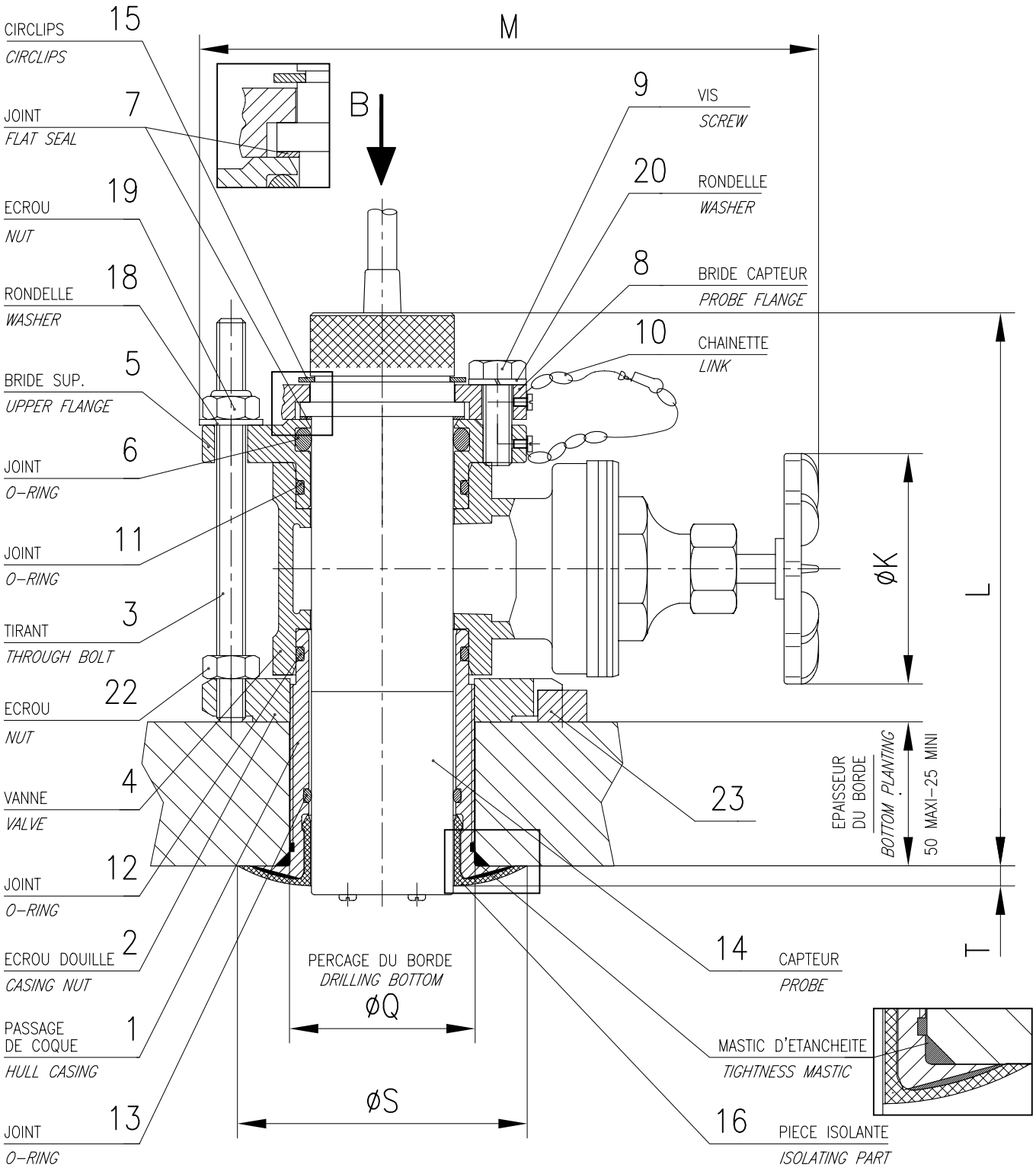
PROBE 481 RB / HULL FITTING 481 RB

CAPTEUR 481 RVB / PIECE DE COQUE 481 RVB
CAPTEUR 651 RVB / PIECE DE COQUE 651 RVB

PROBE 481 RVB / HULL FITTING 481 RVB
PROBE 651 RVB / HULL FITTING 651 RVB

BEN

N° D 0342 folio 1/4



APPLICABILITE
POUR TOUS TYPE DE NAVIRES

APPLICATION
ALL VESSEL TYPES

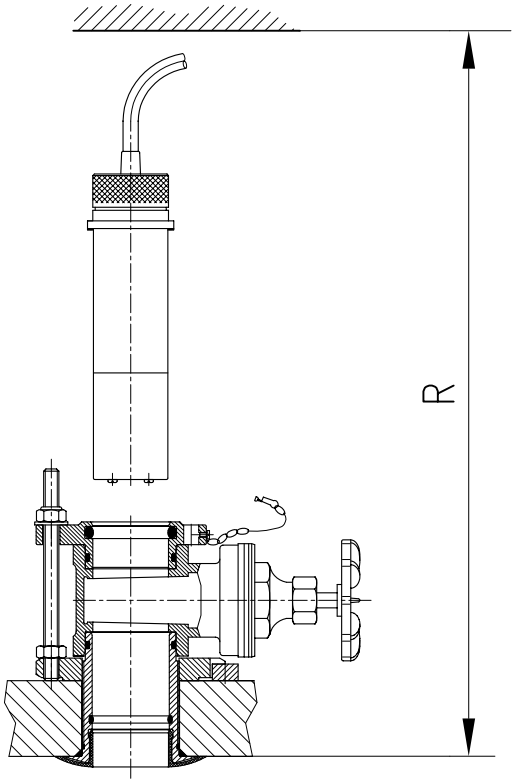
	MATIERE COQUE	*HULL MATERIAL*
481RVB	BOIS PLASTIQUE	*WOOD PLASTIC*
651RVB	BOIS PLASTIQUE ACIER	*WOOD PLASTIC STEEL*

BEN

N° D 0342 folio 2/4

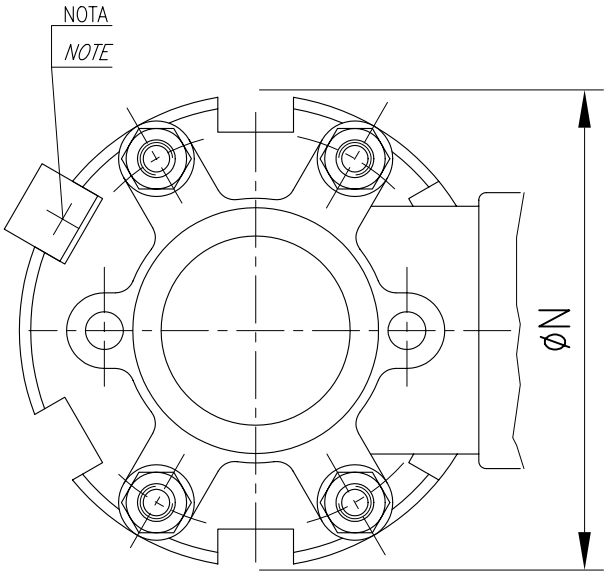
HAUTEUR LIBRE A PREVOIR AU DESSUS
DE L'APPAREIL POUR DEGAGEMENT DU CAPTEUR

CLEARANCE ABOVE FOR PROBE DISMOUNTING



VUE DE DESSUS CAPTEUR RETIRE

VIEW FROM ABOVE WHEN PROBE PULLED OUT



NOTA

EVENTUELLEMENT,PREVOIR L'IMMOBILISATION DE L'ECROU PAR RAPPORT A LA COQUE (FOURNITURE CHANTIER).

NOTE

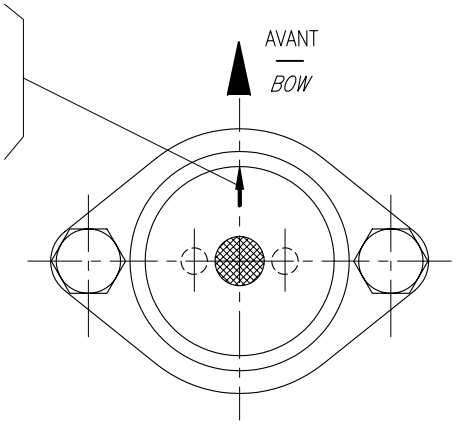
IF POSSIBLE IMMOBILIZE NUT WITH REGARD TO HULL (YARD SUPPLY).

VUE B

B VIEW

FLECHE A POSITIONNER
VERS L'AVANT DU BATEAU

REFERENCE THAT SHALL BE POSITIONED TOWARDS THE BOW



TYPE	K	L	M	N	Q	R	S	T
48	ø100	194	230	ø125	ø64.5	415	ø100	7
65	ø125	244.5	305	ø156	ø93	500	ø130	8.5

- NOTA CONCERNANT LE REP.23 POUR LES CHANTIERS.
  - LE REP.23 SERT DE BLOCAGE A L'ECROU REP.2 PAR RAPPORT A LA COQUE
  - LE FREIN DE L'ECROU SERA SOIT SOUDE SOIT VISSE SUR LA COQUE
  - DANS LE CAS D'UNE COQUE PLASTIQUE,LE FREIN D'ECROU SERA COLLE OU VISSE OU STRATIFIE SUR LA COQUE.

- NOTA CONCERNANT LES COQUES PLASTIQUE POUR LES CHANTIERS.
  - COQUE PLASTIQUE PLEINE PEAU.
    - APRES AVOIR PERCE LA COQUE ENDUIRE LE PERCAGE DE RESINE.
  - COQUE PLASTIQUE TYPE SANDWICH.
    - PREVOIR UN FOURREAU EN BOIS OU EN CONTREPLAQUE ENTRE PIECE DE COQUE ET COQUE POUR EVITER L'ECRASEMENT DE LA COQUE LORS DU SERRAGE DE L'ECROU . CE FOURREAU DOIT FAIRE CORPS AVEC LA COQUE.

- *NOTE FOR SHIPYARDS CONCERNING PART REF.23*
  - *THE PART REF.23 (NUT BREAK) IS USED TO BLOCK THE CASING NUT (REF.2) WITH REGARD TO HULL.*
  - *IT IS WELDED OR SCREWED ON THE HULL.*
  - *FOR PLASTIC HULL , IT IS STICKED , SCREWED OR STRATIFIED ON THE HULL.*

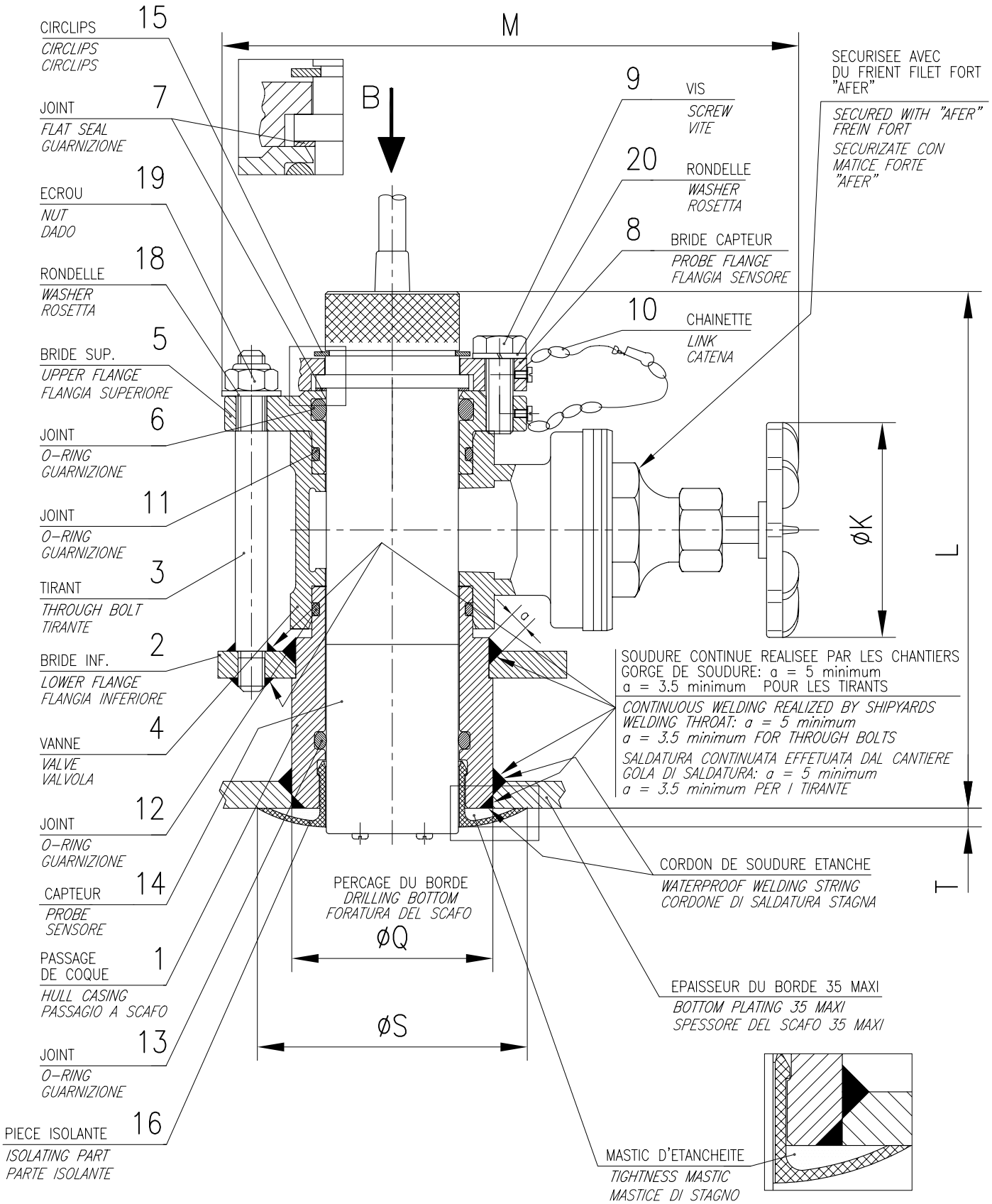
- *NOTE FOR SHIPYARDS CONCERNING PLASTIC HULL.*
  - *FULL (SOLID) SKIN TYPE PLASTIC HULL.*
    - *AFTER THE DRILLING OF THE HULL , COAT THE HOLE WITH RESIN.*
  - *SANDWICH TYPE PLASTIC HULL.*
    - *USE A WOOD OR PLYWOOD SHEATH BETWEEN THE HULL FITTING AND THE HULL TO AVOID THE CRUSHING OF THE HULL WHEN BLOCKING THE NUT. THE SHEATH MUST FORM A PART WITH THE HULL.*

REP. *REF.M*	MATIERE *MATERIAL*	N° PLANS *DRAWING*	CODE
1	CU SN 12	3761-M 5751-M	
2	CU SN 12	3762-M 5752-M	
3	Z2CND17-12-03 316L	4666-M	
4	CU PB5 SN5 ZN5	3742-M 3945-M	
5	CU SN 12	3743-M 5754-M	
6	PERBUNAN		
7	HYDROILIT		
8	CU SN 12	3744-M 5755-M	
9	Z2CN18.10 304L		
10	Z2CN18.10 304L		
11	PERBUNAN		
12	PERBUNAN		
13	PERBUNAN		
14	CU SN 9P	3723-M E0661	
15	BRONZE		
16	NORYL	3745-M 5756-M	
18	Z2CN18.10 304L		
19	Z2CN18.10 304L		
20	Z2CN18.10 304L		
22	Z2CN18.10 304L		

CAPTEUR 481 RVB / PIECE DE COQUE 481 RVI
CAPTEUR 651 RVB / PIECE DE COQUE 651 RVI

PROBE 481 RVB / HULL FITTING 481 RVI
PROBE 651 RVB / HULL FITTING 651 RVI

SENSORE 481 RVB / PASSAGIO A SCAFO 481 RVI
SENSORE 651 RVB / PASSAGIO A SCAFO 651 RVI



APPLICABILITE POUR TOUS TYPE DE NAVIRES COQUE ACIER

APPLICATION ALL VESSEL TYPES STEEL HULL

APPLICABILE PER OGNI TIPI DI NAVE SCAFO IN ACCIAIO

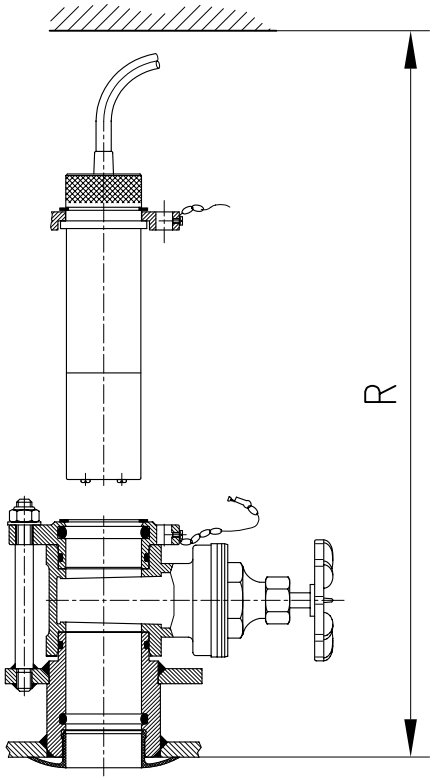
BEN

N° D 0343 B folio 2/5

HAUTEUR LIBRE A PREVOIR AU DESSUS
DE L'APPAREIL POUR DEGAGEMENT DU CAPTEUR

CLEARANCE ABOVE FOR PROBE DISMOUNTING

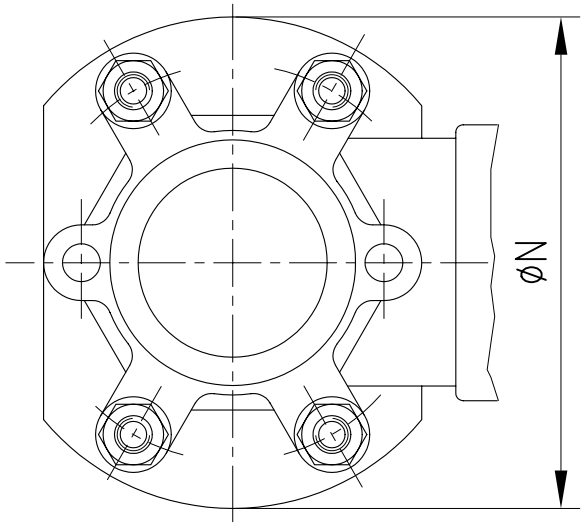
ALTEZZA LIBERA DA LASCIARE SOPRA L'APPARECHIO PER RITIRO DEL SENSORE



VUE DE DESSUS CAPTEUR RETIRE

VIEW FROM ABOVE WHEN PROBE PULLED OUT

VISTA DI SOPRA SENSORE RITIRATO



VUE B

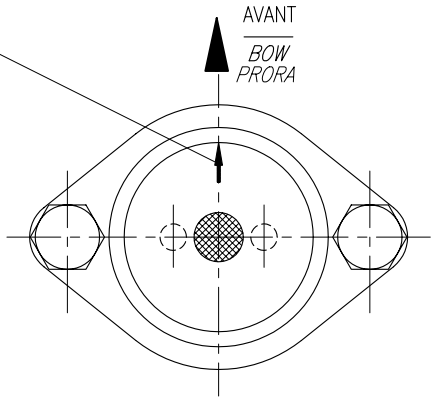
B VIEW

VISTA B

FLECHE A POSITIONNER
VERS L'AVANT DU BATEAU

REFERENCE THAT SHALL BE POSITIONED TOWARDS THE BOW

FRECCIA DA INDIVIDUARE VERSO LA PRORA



TYPE *TYPE* *TYPO*	K	L	M	N	Q	R	S	T
48	ø100	194	230	ø130	ø77	415	ø100	7
65	ø125	244.5	305	ø160	ø92	500	ø130	8.5

– NOTA POUR LES CHANTIERS.

– PREPARATION DE LA COQUE:

– FAIRE UN TROU øQ DANS LE BORDE.
– FAIRE UN CHANFREIN D'ENTREE DE 5mm A 45°.
– DRESSER LA COQUE SUR UN øS.

– APRES SOUDURE DU PIQUAGE SUR LA COQUE:

– PEINDRE L'EXTERIEUR DU PIQUAGE PAR L'INTERIEUR DE LA COQUE APRES SOUDURE DE LA BRIDE REP.2 SUR LE PIQUAGE TOUT EN PRESERVANT L'EXTREMITE SUPERIEURE SIEGE DU JOINT D'ETANCHEITE REP.12 AVEC DE LA PEINTURE TYPE : ZINC EPOXY OU ZINC SILICATE.

– *NOTE FOR SHIPYARDS.*

– HULL PREPARATION:

– DRILL A HOLE øQ IN THE HULL.
– MAKE AN INLET CHAMFER OF 5mm AT 45°.
– STRAIGHTEN THE HULL ON THE øS.

– AFTER THE WELDING OF THE HULL CASING (REF.1) ON THE HULL.

– AFTER THE WELDING OF THE LOWER FLANGE (REF.2) ON THE HULL CASING (REF.1) AND WHILE PROTECTING THE UPPER PART (WHERE O–RING REF.12 IS LOCATED), PAINT THE OUTSIDE OF THE HULL CASING (REF.1) WITH A PAINT TYPE : ZINC EPOXY OR ZINC SILICATE.

– *NOTA PER I CANTIERI*

– PREPARAZIONE DELLO SCAFO:

– PRATICARE UN FORO øQ NEL SCAFO
– PRATICARE UNA MODANATURA D'INGRESSO DI 5mm A 45°
– TORNIRE IL SCAFO SU UN øS

– DOPO SALDATURA DELL' IMPUNTITURA DELLO SCAFO

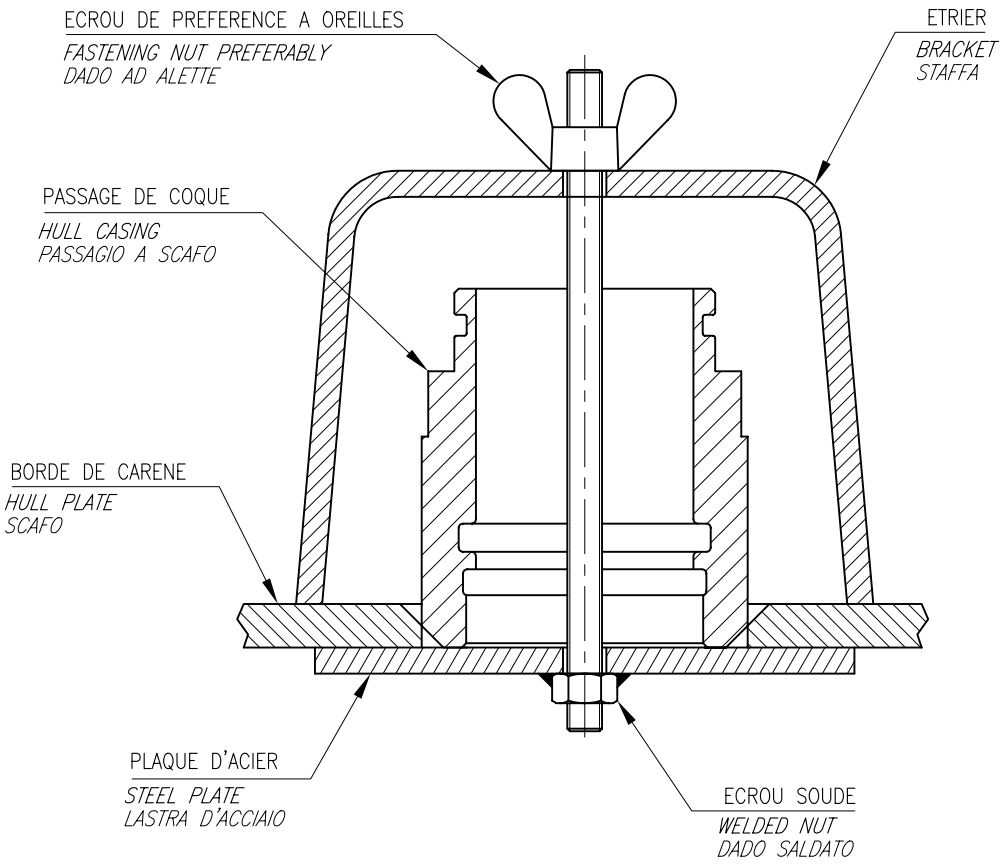
– DIPINGERE L'ESTERNO DELL' IMPUNTITURA DAL' INTERNO DELLO SCAFO DOPO SALDATURA DELLA FLANGIA RIF. 2 SULL IMPUNTITURA, PRESERVANDO L'ESTREMITA SUPERIORE DELLA GUARNIZIONE DI STAGNO RIF.12 CON PITTURA TIPO: ZINCO EPOXY O ZINCO SILICATO.

REP. *REF.M* *RIF.*	MATIERE *MATERIAL* *MATERIE*	N° PLANS *DRAWING* *PIANTA*
1	Z3CND17–12–03 316L	3739–M 5757–M
2	Z3CND17–12–03 316L	3740–M 5758–M
3	Z3CND17–12–03 316L	3741–M 5759–M
4	CU PB5 SN5 ZN5	3742–M 3945–M
5	CU SN 12	3743–M 5754–M
6	PERBUNAN	
7	HYDROILIT	
8	CU SN 12	3744–M 5755–M
9	Z2CN18.10 304L	
10	Z2CN18.10 304L	
11	PERBUNAN	
12	PERBUNAN	
13	PERBUNAN	
14	CU SN 9P	3723–M E0661
15	BRONZE	
16	NORYL	3745–M 5756–M
18	Z2CN18.10 304L	
19	Z2CN18.10 304L	
20	Z2CN18.10 304L	

OUTILLAGE PRECONISE POUR SOUDURE

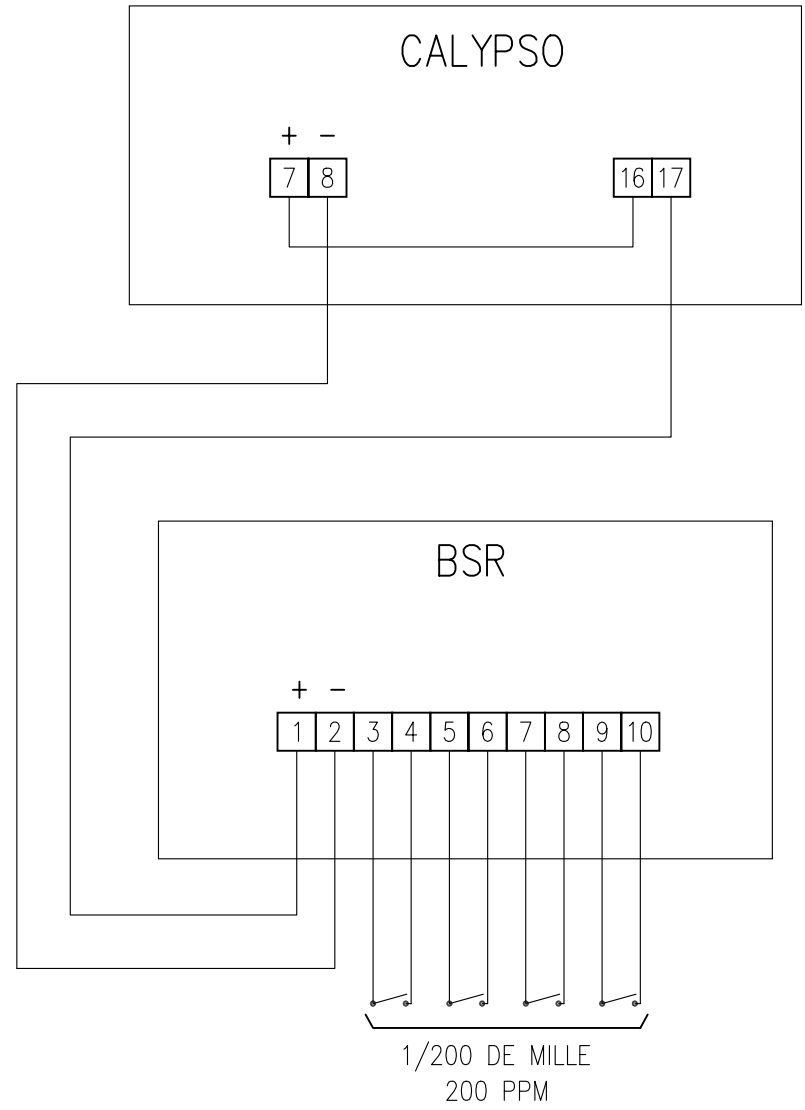
ADJUSTED SYSTEM FOR WELDING

ATTREZZATURA PRECONIZZATO PER SALDARE



BEN

N° D 0343 B folio 5/5



0	17.07.02	Version initiale	ALLEGRE	NOUGIER
Ind.	Date	Modifications	Dessine	Verifie

Matiere	:	–	Tol. Gen.	:	–
Traitement	:	–	Usinage	:	–
Protection	:	–	Echelle	:	–

i2e S.A.
ZAC de Pichaury II
Les Milles 13794
Aix en Provence Cedex03

Titre : CALYPSO / BSR
CABLAGE / CABLING

Format : A4	Folio : 1/1	Ind. 0
F7582		N° : F0187–C

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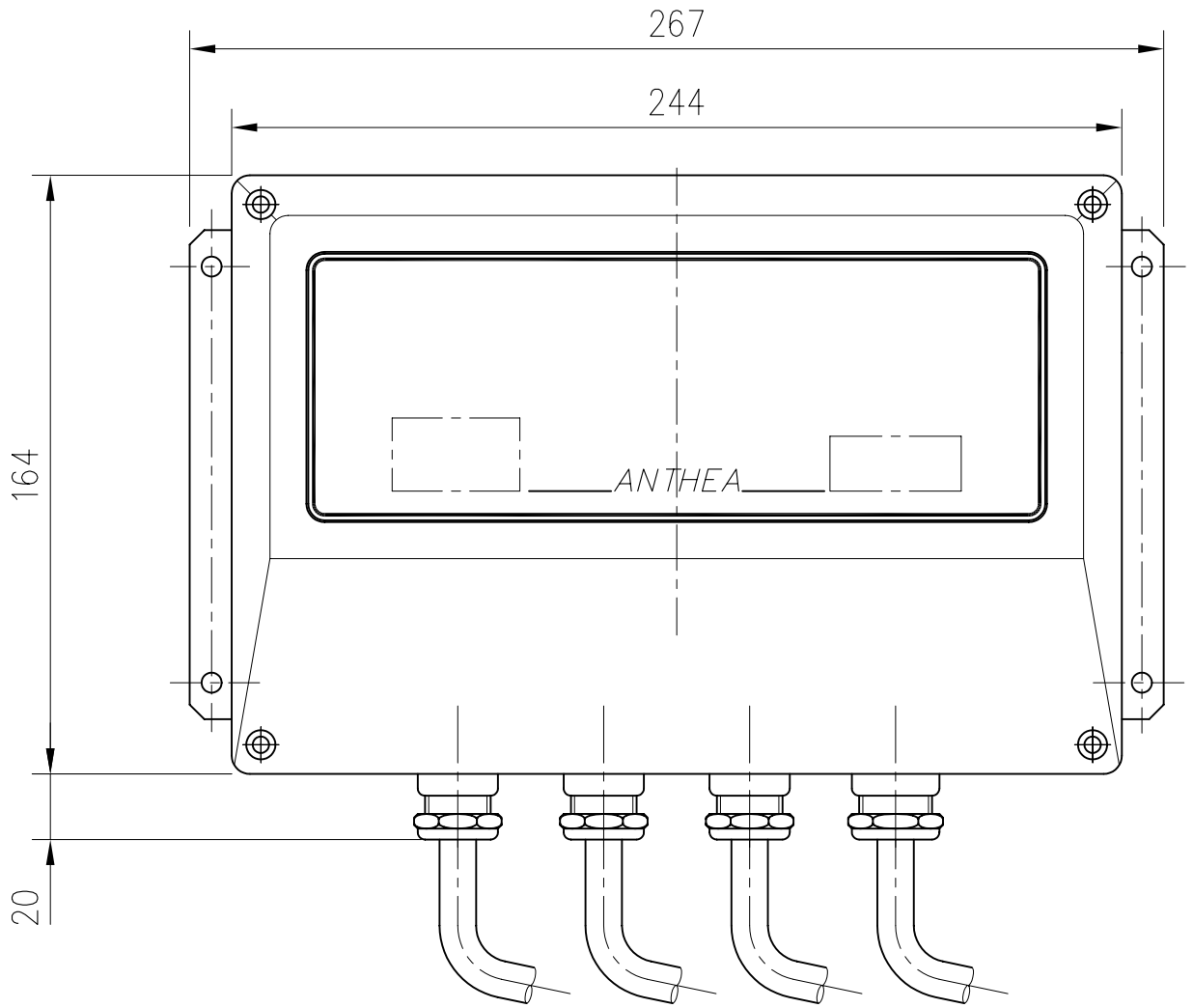
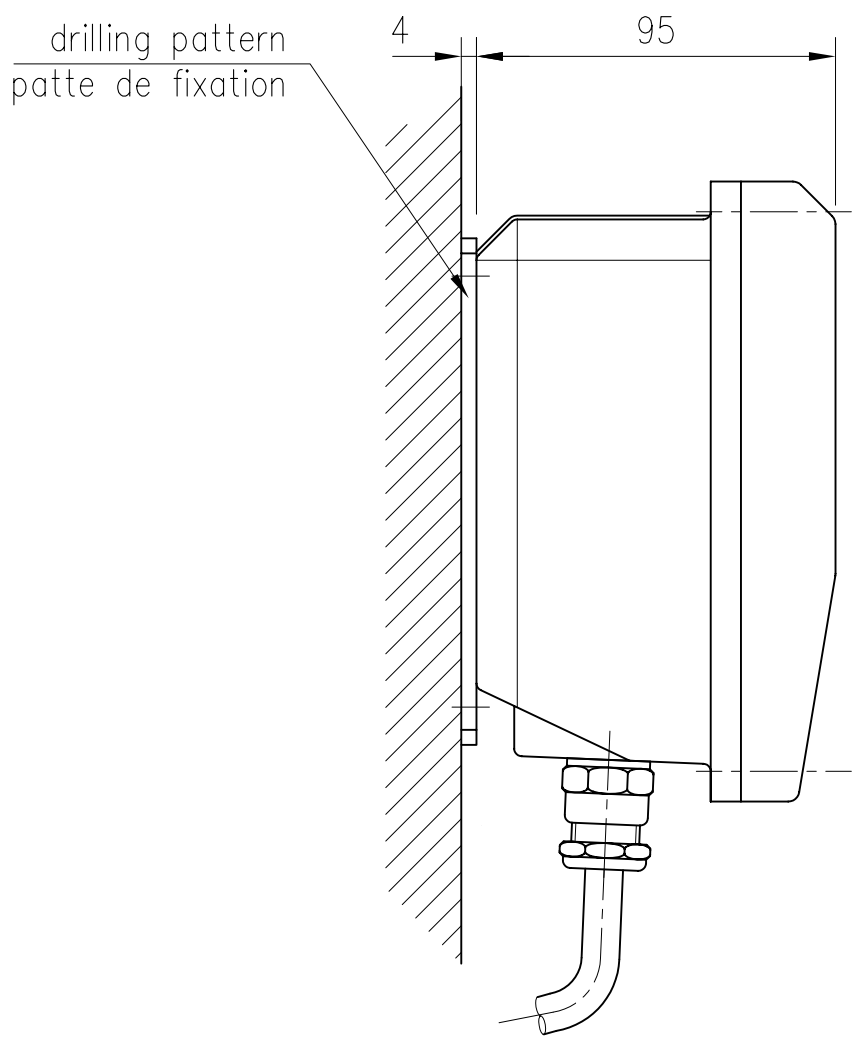
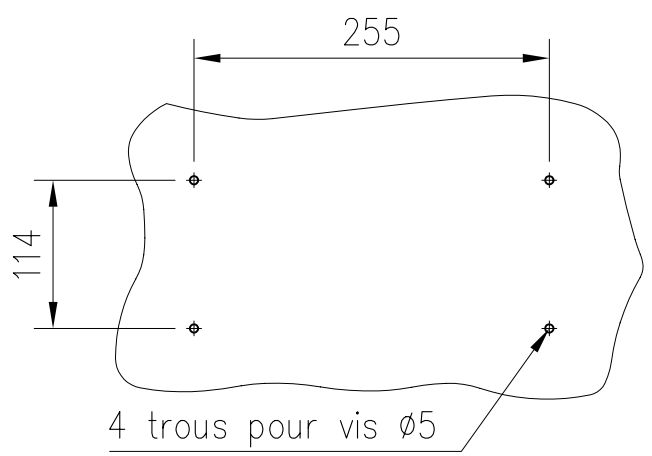
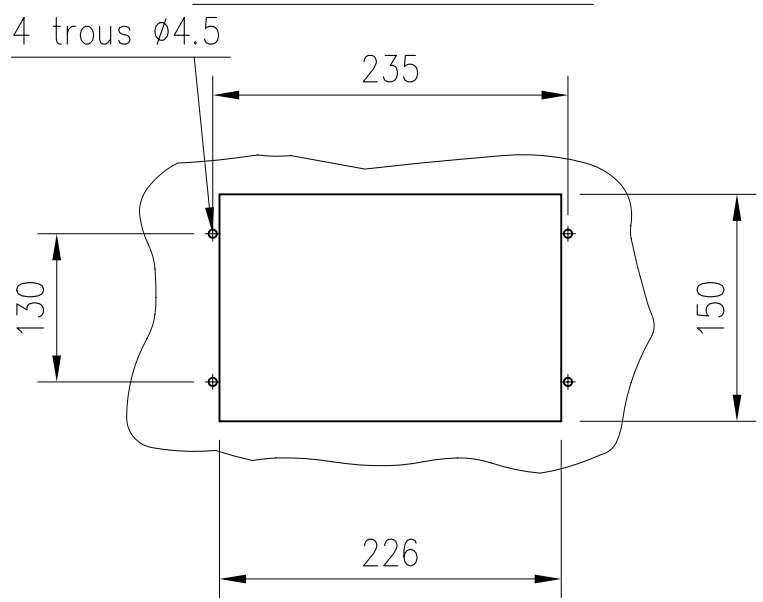




FIXATION – BULK HEAD–
–PLAN DE PERCAGE
MONTAGE AVEC PATTES DE FIXATION–



FLUSH MOUNTED
–PLAN DE PERCAGE
MONTAGE ENCASTRE–



Ind.	Date	Modifications	Dessine	Verifie
A	25.09.96	CHANGEMENT PATTES DE FIXATION EN ACCORD AVEC FABRICATION ENTRE–AXES 98X235 DEVIENT 114X255	ALLEGRE	NOUGIER
0	17.10.95	Version initiale	F.CANDEL	NOUGIER

Matiere	: –	Tol. Gen.	: –
Traitement	: –	Usinage	: –
Protection	: –	Echelle	: 1/2

i2e S.A.
ZAC de Pichaury II
Les Milles 13794
Aix en Provence Cedex03

Titre : ANTHEA BLIND–MOUNTING
ENCOMBREMENT ET POSE

Format : A3	Folio : 1/1	Ind. 0 A
F7582		N° : 6631–M

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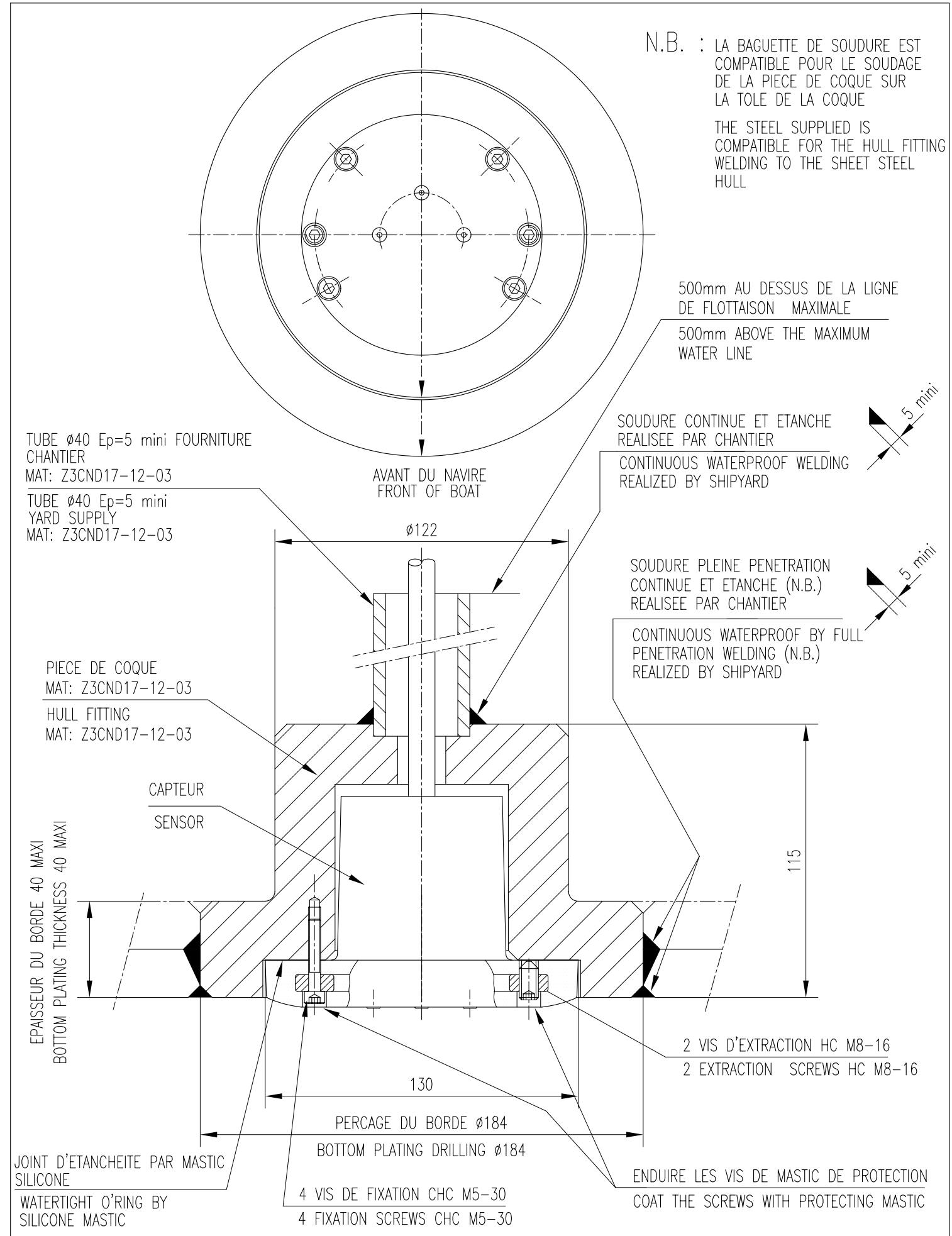
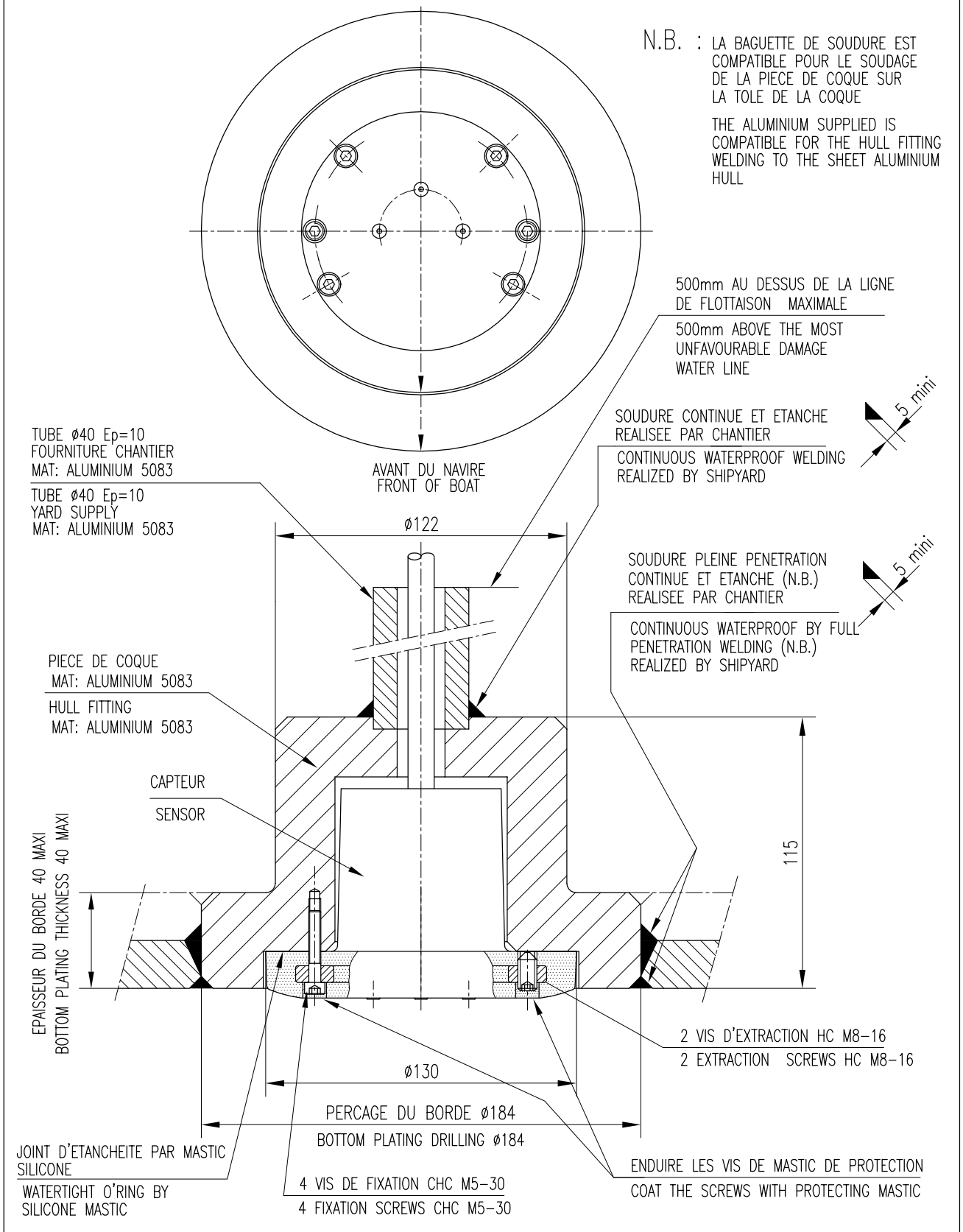
6631A–M.DWG


N.B. : LA BAGUETTE DE SOUDURE EST COMPATIBLE POUR LE SOUDAGE DE LA PIECE DE COQUE SUR LA TOLE DE LA COQUE
THE STEEL SUPPLIED IS COMPATIBLE FOR THE HULL FITTING WELDING TO THE SHEET STEEL HULL
500mm AU DESSUS DE LA LIGNE DE FLOTTAISON MAXIMALE
500mm ABOVE THE MAXIMUM WATER LINE
5 mini
SOUDURE CONTINUE ET ETANCHE REALISEE PAR CHANTIER
CONTINUOUS WATERPROOF WELDING REALIZED BY SHIPYARD
TUBE ø40 Ep=5 mini FOURNITURE CHANTIER
MAT: Z3CND17-12-03
TUBE ø40 Ep=5 mini YARD SUPPLY
MAT: Z3CND17-12-03
AVANT DU NAVIRE
FRONT OF BOAT
ø122
SOUDURE PLEINE PENETRATION CONTINUE ET ETANCHE (N.B.) REALISEE PAR CHANTIER
CONTINUOUS WATERPROOF BY FULL PENETRATION WELDING (N.B.) REALIZED BY SHIPYARD
PIECE DE COQUE
MAT: Z3CND17-12-03
HULL FITTING
MAT: Z3CND17-12-03
CAPTEUR
SENSOR
EPAISSEUR DU BORDE 40 MAXI
BOTTOM PLATING THICKNESS 40 MAXI
115
2 VIS D'EXTRACTION HC M8-16
2 EXTRACTION SCREWS HC M8-16
130
PERCAGE DU BORDE ø184
BOTTOM PLATING DRILLING ø184
JOINT D'ETANCHEITE PAR MASTIC SILICONE
WATERTIGHT O'RING BY SILICONE MASTIC
4 VIS DE FIXATION CHC M5-30
4 FIXATION SCREWS CHC M5-30
ENDUIRE LES VIS DE MASTIC DE PROTECTION
COAT THE SCREWS WITH PROTECTING MASTIC

BEN

CAPTEUR LENTILLE ET PIECE DE COQUE
LENS SENSOR AND HULL FITTING

N° 7851-M IND. A


N.B. : LA BAGUETTE DE SOUDURE EST COMPATIBLE POUR LE SOUDAGE DE LA PIECE DE COQUE SUR LA TOLE DE LA COQUE
THE ALUMINIUM SUPPLIED IS COMPATIBLE FOR THE HULL FITTING WELDING TO THE SHEET ALUMINIUM HULL
500mm AU DESSUS DE LA LIGNE DE FLOTTAISON MAXIMALE
500mm ABOVE THE MOST UNFAVOURABLE DAMAGE WATER LINE
AVANT DU NAVIRE
FRONT OF BOAT
TUBE ø40 Ep=10
FOURNITURE CHANTIER
MAT: ALUMINIUM 5083
TUBE ø40 Ep=10
YARD SUPPLY
MAT: ALUMINIUM 5083
SOUDURE CONTINUE ET ETANCHE REALISEE PAR CHANTIER
CONTINUOUS WATERPROOF WELDING REALIZED BY SHIPYARD
5 mini
ø122
SOUDURE PLEINE PENETRATION CONTINUE ET ETANCHE (N.B.) REALISEE PAR CHANTIER
CONTINUOUS WATERPROOF BY FULL PENETRATION WELDING (N.B.) REALIZED BY SHIPYARD
5 mini
PIECE DE COQUE
MAT: ALUMINIUM 5083
HULL FITTING
MAT: ALUMINIUM 5083
CAPTEUR
SENSOR
115
EPAISSEUR DU BORDE 40 MAXI
BOTTOM PLATING THICKNESS 40 MAXI
2 VIS D'EXTRACTION HC M8-16
2 EXTRACTION SCREWS HC M8-16
ø130
PERCAGE DU BORDE ø184
BOTTOM PLATING DRILLING ø184
JOINT D'ETANCHEITE PAR MASTIC SILICONE
WATERTIGHT O'RING BY SILICONE MASTIC
4 VIS DE FIXATION CHC M5-30
4 FIXATION SCREWS CHC M5-30
ENDUIRE LES VIS DE MASTIC DE PROTECTION
COAT THE SCREWS WITH PROTECTING MASTIC

GROUPE i2e DiFFUSiON

ZAC de Pichaury II
BP102000
13793 AIX EN PROVENCE
CEDEX 3

CAPTEUR LENTILLE ET PIECE DE COQUE ALUMINIUM

—

LENS SENSOR AND ALUMINIUM HULL FITTING

—

Dess. *Drawn.*	Ver. *Chec.*	Date *Date*	Folio: 1/1	Ind. 0
ALLEGRE	NOUGIER	18/10/2001	N° : F0354-M	

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F0354-M.DWG

MARINE DIVISION
17 Bis Place des Reflets - La Défense 2
92400 Courbevoie - France
Tel. 33 1 42 91 52 91
Fax 33 1 42 91 28 94

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Certificate N°:
08296/B0 EC
File Number : NAV 05/1356/02
MED item number : **A.1/4.7**
This Certificate is not valid where presented without the full attached Schedule,composed of 10 sections.

BUREAU VERITAS

EUROPEAN COUNCIL DIRECTIVE 96/98 EC on MARINE EQUIPMENT (M.E.D.)

EC TYPE EXAMINATION CERTIFICATE

(CERTIFICATE OF TYPE APPROVAL)

This is to certify that Bureau Veritas, acting within the scope of its notification , did undertake the relevant type approval procedures for the equipment identified below which was found to be in compliance with the International Instruments and testing standards under the requirements of Council Directive 96/98/EC, as amended.

SPEED AND DISTANCE MEASURING EQUIPMENT (SDME)

Ship Speed Log CALYPSO.

MANUFACTURED BY:

I2E DIFFUSION

Aix-en-Provence - FRANCE

REGULATIONS & STANDARDS in accordance with Council Directive 96/98/EC, as amended by Commission Directive 2002/75/EC :
SOLAS 74, as amended, Regs. V/19.2.3.4 - IMO Resolution: A.824(19), as amended, by MSC 96(72) ; IMO Resolution A.694(17) - MSC 97(73) 13.3 (2000 HSC Code) ; IEC 61023(1999), IEC 60945(1996), IEC 61162.

Expiry date: 12/05/2009

Local Office : BUREAU VERITAS MARSEILLES

At Paris la Défense, on : 08/03/2004

Responsable Marine
Secteur Sud

BUREAU VERITAS EXPERTS PARIS 1828 REGISTRE INTERNATIONAL DE MARSEILLE

J.BENOIT
Marine Equipment Certification Manager
For BUREAU VERITAS, EC Notified Body N°0062

The Manufacturer is allowed to affix the MED Conformity Mark to approved equipment and issue a Declaration of Conformity, only when the production/product assessment module referred to in the Directive 96/98/EC, is fully complied with.
This Certificate remains valid until its date of expiry, unless cancelled or revoked, providing the conditions in the attached Schedule are complied with and the equipment remains satisfactory in service.This Certificate does not apply to equipment which has been varied or modified from the specimen tested.
Should the specified standards be amended during the validity of this Certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the ammended standards apply.
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Issued under the authority of the French Maritime Administration.

BUREAU VERITAS
MARINE DIVISION

File Number : NAV 05/1356/02

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :

"SHIP SPEED LOG CALYPSO"

1.1 - The standard equipment including:

1.1.1 One main cabinet with:
- 1.1.1.1 - One LCD screen for digital and pseudo-analog speed display
- 1.1.1.2 - One electromechanical mile totalizer
- 1.1.1.3 - One daily mile totalizer (on LCD)
- 1.1.1.4 - One display unit allowing adjustment of the different correction point
- 1.1.1.5 - One dimmer

1.1.2 One transmitter cabinet

1.1.3 One 48.1 RVB 16 sensor, retractable at sea or 65.2 RVB 20 sensor, retractable at sea.

1.1.4 One hull-fitting with valve, 48.1 RVB (screw- on type)
or
1.1.5 One hull-fitting with valve, 48.1 RVI (weld- on type) or 65.1 RVI (weld on type)

1.1.6 One Lens sensor with Lens hull-fitting designed for double hull vessels or for location into submerged ballast tank.

1.2 - Options:

1.2.1 GA120 analog speed and distance repeater
1.2.2 RGD100 combined
1.2.3 XY version

1.3 - Miscellaneous:

1.3.1 Power supply: 220 V 50/60 Hz (± 10 %) or 24 Vdc (+30% - 10%) or 110V 50/60Hz (+/- 10%)
1.3.2 Index of protection: IP65

2. DESIGN DRAWINGS and/or SPECIFICATIONS

2.1 - In accordance with the manufacturer's drawings and documents

- operation and installation manual N° 99MU001-B
- filled in NAV 05/1356/02

2.2 - Manufacturing documentation: to be approved by the Society prior to EC ⎈ marking authorization.

2.3 - Manual(s) for installation, use and maintenance
- to be stamped by a Society's Surveyor
- to be available in one of the IMO languages in addition to the ship's flag language.

BUREAU VERITAS EXPERTISE

3. TYPE TEST REPORTS / LABORATORY RECOGNITION STATUS

3.1 - Vibration test report N° 500689 CTSN EMI/NP/98 dated 9 April 1998 issued by DGA in France

3.2 - Report on type approval testing of the loch in accordance with IEC 60945 and IEC 61023.
Reports N° BSH/30/25L/95 dated 7 May 1996
N° 005/96/U dated October 1995
Issued by Federal Maritime and Hydrographic Agency (BSH), Germany
N° 95/905-2 dated 6 November 1995 issued by EMV-Labor MAZ, Germany
N° 20/6248/95-S4320 dated 24 August 1995 issued by BSH, Germany.
N° BSH/30/25L/1/98 dated 02 July 1998 issued by BSH, Germany.

3.3 - Metrology report N° 99 RT 036 dated 07/05/1999 issued by the Manufacturer in house laboratory.
Society 's witnessing to test had been carried out.

3.4 - EMC test carried out by SIEMI Laboratory 03/05/1999.
Society's witnessing to test had been carried out.

3.5 - Report of conformity with IEC 61162 dated 19/09/2002.

4. MATERIALS or COMPONENTS REQUIRED TO BE TYPE APPROVED or TYPE TESTED

Nil.

5. OTHER MATERIALS and/or COMPONENTS

Nil.

6. APPLICATION / LIMITATION OF USE

6.1 - In drydock, never paint nor grease the electrodes of the sensor.

6.2 - According to vessel tonnage

- Hull-fittings with valve (48.1 RVI - 48.1 RVB) or 65.1 RVI or lens hull fitting
  * are used on all types of vessels

- Hull-fittings without valve (48.1 RB - 48.1 RA - 48.1 RBL - 48.1 RI) are used on:
  * 500 toners maximum
  * Fishing ships of maximum length 45 m
  * Yachts.

6.3 - Hull fitting cannot be used in dangerous compartments (fuel, hydrocarbons, chemicals).

6.4 - Hull strength must be checked before installation of hull fitting.

6.5 - Hull fitting must be installed in compliance with the specifications of the ship classification Society.

6.6 - Power supply wiring must comply with the specifications of the ship classification Society.

7. PRODUCTION SURVEY REQUIREMENTS

7.1 - Arrangements shall be made for a Society's Surveyor to carry out, on a periodic basis, visits of the manufacturer's premises and product audits.

7.2 - The production conformity assessment Module shall be "D" Production Quality Assurance.

7.3 - Each manufactured equipment is to bear the ❁ mark and BV notification number (0062) subject to authorization of the Society.

7.4 - Each electromagnetic log intended to be fitted on board a ship registered with a national register adhering to the Directive shall be delivered with a Declaration of Conformity, which shall be signed by the manufacturer.

7.5 - Each equipment is to be supplied with manual(s) for installation, use and maintenance (cf. 2.3 above).

8. ON BOARD INSTALLATION & MAINTENANCE REQUIREMENTS

As per requirements of regulations stated on the front page of the certificate and according to the manufacturer's specifications.

9. MARKING FOR IDENTIFICATION

- Maker's name or trade mark,
- Serial number of the units,
- Equipment type number or model identification under which it was type-tested,
- ❁ 0062 or ❁ BV 0062 and the two last digits of the manufacturing year.

10. OTHERS

10.1 - This approval is given on the understanding that the Society reserves the right to require check tests to be carried out on the electromagnetic log at any time, and that **I2E DIFFUSION, 1030 Av. Guillibert de la Lauzière, ZAC de Pichaury II, 13290 LES MILLES, FRANCE,** will accept the responsibility for informing shipbuilders or their sub-contractors of the proper methods of use and general maintenance of the electromagnetic log and the conditions of this approval.

10.2 - This certificate supersedes Type Approval Certificate n° 08296/A2 EC issued on 03/11/1999 by the Society.

**** Last page (End of Document) ****

BUREAU VERITAS MARSEILLES

BEN/I2E MARINE AGENTS / DISTRIBUTORS

SNEE
Bordeaux
France
Tel 05 56 39 24 40
Fax 05 56 50 23 10

SEDAM
Lorient
France
Tel 02 97 37 11 13
Fax 02 97 37 53 81

FURUNO DK*
Hvidovre-Copenhagen
Denmark
Tel +45 36 77 45 00
Fax +45 36 77 45 01

R.H. GREECE*
Piraeus
Greece
Tel +30 210 411 0260
Fax +30 210 417 7784

SYBERG Maritim*
Oslo
Norway
Tel +47 23 03 75 00
Fax +47 23 03 75 05

MARINE Technics
St Petersburg
Russia
Tel +7 812 332 32 42
Fax +7 812 332 32 34

R.H. USA*
Long Beach
U.S.A.
Tel +1 562 595 0039
Fax +1 562 988 0236

R. H. Hong Kong
Kwai Chung, N.T.
Hong Kong
Tel +852 2 423 90 07
Fax +852 2 480 58 98

CRM
Boulogne Sur Mer
France
Tel 03 21 30 45 13
Fax 03 21 30 45 06

CRM
St Malo
France
Tel 02 99 82 68 43
Fax 02 99 82 28 02

AND Group
Tyne & Wear
England
Tel +44 870 444 9681
Fax +44 870 444 9680

ELCON
Reykjavik
Iceland
Tel +354 561 9510
Fax +354 561 8281

ESCORT LTD*
Szczecin
Poland
Tel +48 91 462 4379
Fax +48 91 462 4408

BORA SPARE Parts
Istanbul
Turkey
Tel +90 216 383 7755
Fax +90 216 383 7766

SOREMAR
Casablanca
Morocco
Tel +212 22 40 50 50
Fax +212 22 24 82 36

JASON Electronics
Singapore

Tel +65 687 20 211
Fax +65 687 21 800

AEMI
Caen
France
Tel 02 31 35 44 47
Fax 02 31 82 47 02

THEMYS
Marseille
France
Tel 04 42 32 99 05
Fax 04 42 32 94 95

MERE Electroonik
Tallinn
Estonia
Tel +372 6102 048
Fax +372 6102 248

BARRY Electronics
Killybegs Co. Donegal
Ireland
Tel +353 74 97 31215
Fax +353 74 97 31739

ENAMOR
Gdynia
Poland
Tel +48 58 661 6363
Fax +48 58 621 8486

TRANSAS
Nikolaev
Ukraine
Tel +380 512 507 116
Fax +380 512 507 117

PERTEC
Cape Town
South Africa
Tel +27 21 511 50 55
Fax +27 21 511 50 22

R. H. Singapore*
Singapore

Tel +65 686 22 218
Fax +65 686 22 430

CRM
Concarneau
France
Tel 02 98 97 09 65
Fax 02 98 97 80 83

Marseille MARINE
Marseille
France
Tel 04 91 91 31 42
Fax 04 91 91 69 46

INSALKO AB
Helsinki
Finland
Tel +358 90 685 3860
Fax +358 90 685 3870

HANZA Elektronika
Riga
Latvia
Tel +371 70 20 459
Fax +371 73 20 772

NAUTEL Sistemas
Lisboa
Portugal
Tel +351 21 392 0940
Fax +351 21 392 0949

MARCOM Watson
Tasmania
Australia
Tel +61 3 6331 2711
Fax +61 3 6331 6332

R. H. South Africa
Durban
South Africa
Tel +27 31 20 55 309
Fax +27 31 20 55 541

SAAB Rosemount
Singapore

Tel +65 686 32 222
Fax +65 686 32 383

ST GUE
Concarneau
France
Tel 02 98 97 50 86
Fax 02 98 50 75 57

Electr. Equipements
Montivilliers
France
Tel 02 32 79 29 60
Fax 02 35 20 82 75

ELNA
Rellingen
Germany
Tel +49 4101 301 218
Fax +49 4101 301 214

R.H. NEDERLAND*
Rotterdam
The Netherlands
Tel +31 10 428 3344
Fax +31 10 428 1498

RMI SA*
Madrid
Spain
Tel +34 913 587 450
Fax +34 917 360 022

MARINE Navaid S.
Sydney
Australia
Tel +61 2 9700 1566
Fax +61 2 9700 1756

AERADIO Technical
Manama
Bahrain
Tel +973 727 790
Fax +973 727 811

NAVICOM*
Pusan
Korea
Tel +82 51 442 4555
Fax +82 51 442 6316

CEGELEC
Dieppe
France
Tel 02 35 06 89 24
Fax 02 35 06 89 50

ETNA
Octeville/Mer
France
Tel 02 35 54 60 60
Fax 02 35 54 60 69

HDW HAGENUK
Hamburg
Germany
Tel +49 40 899 720
Fax +49 40 899 72199

SAM Electronics*
Rotterdam
The Netherlands
Tel +31 10 479 5444
Fax +31 10 479 5545

RMI SA
Cadiz
Spain
Tel +34 956 277 123
Fax +34 956 251 757

WRIGHT Techno
Albany Auckland
New Zealand
Tel + 649 4760 284
Fax +649 4760 281

ZENER Electronics
Dubai
U.A.E
Tel +971 4352 2880
Fax +971 4352 4410

AMI GFV
Busan
Korea
Tel + 8251 414 9933
Fax +8251 414 9931

NAVELEC
Le Havre
France
Tel 02 35 24 09 05
Fax 02 35 25 35 59

R.H. BELGIUM*
Antwerpen
Belgium
Tel +32 3 320 99 60
Fax +32 3 320 99 61

PRO NAUTAS
Leer
Germany
Tel +49 491 98 79 00
Fax +49 491 98 79029

ALPHATRON Mar.
Rotterdam
The Netherlands
Tel +31 10 453 4000
Fax +31 10 452 9214

AAGE HEMPEL*
Algeciras
Spain
Tel +34 956 57 3276
Fax +34 956 60 20 88

RC MARINE Electr.
Nova Scotia
Canada
Tel +1 902 468 2405
Fax +1 902 468 9194

JASON Electronics
Shanghai
China
Tel +86 21 6386 6071
Fax +86 21 6386 6070

RESON
Kaohsiung
Taiwan
Tel +886 7 815 0036
Fax +886 7 815 1438

EBS
Loctudy
France
Tel 02 98 87 91 33
Fax 02 98 87 91 46

AMPLIDAN*
Horsholm
Denmark
Tel +45 45 166 201
Fax +45 45 166 276

SAM Electronics
Hamburg
Germany
Tel +49 40 88 250
Fax +49 40 88 254000

WNL Marine*
Ijmuiden
The Netherlands
Tel +31 255 53 4655
Fax +31 255 53 7184

BAJCK Group
Murmansk
Russia
Tel +7 815 256 0149
Fax +7 815 256 0149

R.H. USA*
Houston Texas
U.S.A.
Tel +1 713 378 2100
Fax +1 713 378 2101

ELEKON Company
Kowloon
Hong Kong
Tel +852 277 06 161
Fax +852 278 07 197

* Service stations.